ARCADIS Design & Consultancy for natural and built assets

CITY OF HOLLYWOOD
WATER MASTER PLAN UPDATE – PHASE 2
January 12th, 2022

WATER MASTER PLAN UPDATE – PHASE 2 SCOPE

INTRODUCTION

The City has selected Arcadis U.S., Inc. (Arcadis) and its designated subconsultants (McKim & Creed and Tobon Engineering) to furnish professional engineering services for the Water Master Plan update. This includes overall project management, project initiation, demand and hydraulic evaluations, condition assessment, water plant performance evaluation, and compilation of CIP proposals into a comprehensive 20-year Water Master Plan (through 2040).

The work to be performed by Arcadis for the Water Master Plan Update was commenced on March 31, 2021 and is scheduled to be complete by the end of FY2022. As a result, the scope of work was separated into two phases to accommodate the City's FY funding requirements. Phase 1 (ATP issued 3/31/2021) tasks are nearing completion and will transition directly into Phase 2 tasks which culminate with the delivery of the updated Water Master Plan. Phase 2 Tasks are budgeted for FY2022 and their associated funding are summarized in Attachment A and B.

PROJECT UNDERSTANDING

The City of Hollywood (City) is located in the southeast portion of Broward County, Florida. It is bordered on the north by the City of Dania Beach, the City of Fort Lauderdale, and unincorporated portions of Broward County, on the east by the Atlantic Ocean, on the south by the City of Miramar, the City of Pembroke Park, and the City of Hallandale Beach, and on the west by the City of Pembroke Pines and the Conservation area (Everglades). As an enterprise fund, the City owns and operates a potable water system to supply safe and reliable drinking water to its water customers.

The City's current service area population is approximately 200,500 and is expected to grow modestly to 228,100 through 2040. The City's Department of Public Utilities operates or has service agreements for approximately 22 raw water wells (e.g., 14 Biscayne Aquifer wells and eight Floridan aquifer wells). Raw water is pumped to and treated at the City's Water Treatment Plant (WTP) located at 3441 Hollywood Blvd, Hollywood, FL 33021. At the WTP, the City currently treats an average 24.5 million gallons day (MGD) through the lime softening, membrane softening, or reverse osmosis processes prior to blending, storage and pumping into the distribution system. The distribution system includes approximately 700 miles of water main piping with diameters ranging from 2-in to 30-in diameter that are connected to two 1.0 million gallon (MG) elevated tanks and a booster station, the West Hollywood Pumping and Storage Facility (WHPS).

The last comprehensive Water Master Plan update was completed in 2007 and has been successfully applied by the City to guide expansion, rehabilitation, and replacement decisions. Since then, multiple amendments have been issued to the Water Master Plan to reflect major system changes such as facility expansions, water main replacement, and deep injection wells.

As part of the on-going planning cycle, the City now requires an update to the current Water Master Plan to assess and prioritize major assets that will require expansion, rehabilitation, or replacement in the next 20 years. The objective of the Water Master Plan update is to assess the current condition and remaining useful life of the water system assets, understand the growth and needs for new assets, and then identify prioritized projects that address aging infrastructure, consider climate change and sea level rise, improve reliability of service, enhance operational efficiencies, and provide for process optimization. The updated Water Master Plan will be developed using a living master plan approach that allows for dynamic reporting and future updates to the inputs and evaluations that drive the capital project planning within the Water Master Plan. This will be enabled using an Arcadis-developed application that will be customized for the City. The tool is relatively easy to use and maintain and only requires software and IT resources that are readily available at the City. After the completion of the Water Master Plan update, all data and the living master plan tool will be transferred onto and ultimately reside securely within the City's computer network.

SCOPE OF WORK

The following scope of work is a continuation from the scope elements initiated in Phase I. Accordingly, the work commenced under Phase 1 is integral to and will be finalized under Phase 2 as part of completing the scheduled deliverables.

TASK 1 – PROJECT MANGEMENT AND INITIATION

Task 1.1 –Project Management and Administration (Continuation to Completion) (PHASE2)

Arcadis shall provide for continued coordination and management of the various tasks associated with fulfillment of the work. Project management effort includes Arcadis staffing, subconsultant coordination and oversight, budget and schedule management. Arcadis shall provide written monthly project status updates with each invoice in addition to updating the baseline schedule consistent with reporting in Phase I.

On a monthly basis, Arcadis shall conduct a project status meeting conference call with the City. The intent of this meeting, that is typically planned for 1-hr, is to provide working and interim updates on active project tasks and solicit ad-hoc feedback where necessary. The Arcadis Project Manager (PM) will prepare an agenda in advance of each meeting and select task leaders and team members will attend the meeting each month to report on progress and obtain feedback from the City. The key decisions and discussions from the meeting will be captured on a master Decision/Action Items Log for tracking and resolution.

Deliverable(s):

- *Monthly Project Status Meeting Agenda*
- *Monthly Invoices*
- *Monthly Schedule Updates*
- *Decision/Action Items Log Updates*

TASK 2 – HYDRAULIC MODELING, FUTURE DEMAND PROJECTIONS, & WATER SUPPLY EVALUATION

Task 2 was fully funded as part of and scheduled to be completed in Phase I. For detailed scope description refer to Agreement for Phase I dated March 18, 2021.

TASK 3 – CONDITION ASSESSMENT

Task 3 was fully funded as part of and scheduled to be completed in Phase I. For detailed scope description refer to Agreement for Phase I dated March 18, 2021.

TASK 4 – WATER TREATMENT PLANT PERFORMANCE EVALUATION

Task 4 was initiated during Phase 1 (FY2021) and will be completed under Phase 2 (FY2022). Funding allocations designated for Phase 2 are planned to supplement the budget previously allocated in Phase 1 for Tasks 4.1. Task 4.2 is entirely funded under the Phase 2 budget.

Task 4.1 – Performance Evaluations (Continuation to Completion) (PHASE 2)

The performance evaluation will build on the facility condition assessments and begin concurrently with Task 3. Arcadis shall leverage our past experience and knowledge of the WTP and begin the evaluation with a review of the WTP and system operating data for the past three years with a specific focus on the current operational practices and future needs. This includes plant flow, unit process regulatory and water quality performance data and chemical dosage and feed rate data. Arcadis will meet with WTP staff to discuss our initial observations and obtain input on their specific concerns and challenges. Arcadis shall note potential compliance challenges and identify treatment or operational strategies so that the City remains in compliance now and for future compliance. Where multiple compliance strategies are possible, Arcadis will review and identify the most appropriate alternative as part of alternatives analysis in Task 5.

This task includes the following evaluations and will culminate with the performance rating to be incorporated into the risk scoring in Task 5:

- Future Regulatory Summary – Arcadis will prepare a summary of future regulatory and water quality requirements, emphasizing those issues that are most critical to the City's system.
- Water Quality Performance Evaluation – Arcadis will summarize and evaluate the City's WTP processes and finished water quality goals, considering both compliance with existing and future regulatory requirements and optimizing operations. Arcadis will coordinate with City staff to re-confirm finished water quality goals meet desired treatment levels and enable consistent compliance with current and anticipated future regulatory requirements. Arcadis will summarize historical water quality performance and assess the capability of existing treatment practices to meet the long-term water quality objectives identified above. Arcadis will highlight any water quality goals, issues or constraints that may impact water quality performance relative to regulatory requirements.
- Treatment Capacity and Hydraulic Evaluation – Arcadis will evaluate improvements to maintain and/or increase production capacities at the City's system. As part of this assessment, Arcadis will define the capacities of the facility based on a hydraulic assessment, recommended design standards, state requirements and engineering judgement and experience. Potential constraints and hydraulic limitations will be identified and potential improvements to eliminate existing capacity constraints will be formulated and evaluated to ensure the facility can meet future capacity requirements.
- Reliability and Redundancy Evaluation – Arcadis will identify vulnerabilities within the treatment processes that can negatively impact plant performance. The evaluation will incorporate condition assessment results for individual assets in developing a comprehensive assessment of current and

potential future process-related issues, including resiliency, redundancy, back-up power, maintenance issues and other factors identified during the condition assessment visits.

- Chemical Storage and Feed Systems Evaluation – Arcadis will review the chemical systems and chemical dosing practices to identify opportunities to optimize system performance and potentially reduce chemical usage. Under this task, Arcadis will review the sampling and monitoring protocols currently used for process control at the WTP and make recommendations where appropriate to improve process reliability or reduce operating costs.
- Energy and SCADA Optimization – Arcadis will complete an evaluation of the facility's power and SCADA systems including:
    - Review of electrical systems of pump and motor efficiencies for the major pumping operations (includes WHSP) to identify opportunities to improve energy efficiency and reduce operating costs. Arcadis will review the existing electrical rate schedule to confirm if there are opportunities to develop a more cost-effective operating strategy. This includes evaluation of pumping scenarios from systems evaluation in Task 2.

    - Review of SCADA system to determine the adequacy of the infrastructure as it relates to other similarly sized WTPs. This will be summarized in recommendations for an overall SCADA controls strategy that improves monitoring, control, safety, and the operations of processes throughout the WTP. This strategy can then be incorporated into future design contracts to provide consistency across the variety of capital improvement projects to be implemented at the WTP over the next few years.

- Utilities Evaluation – Arcadis will review supporting utilities, including electrical, lighting, HVAC, plumbing, controls, and instrumentation for compliance with existing codes, potential future building codes and regulatory requirements, safety, and their likelihood for failure. Arcadis will additionally provide the following:
    - Cost/benefit analysis of the ability to provide a renewable energy source, whether on plant property or other City property.
    - Evaluate of heat loading including the relocation of MV transformers to outdoors.
    - Evaluate for energy monitoring and trending of the facilities, acquiring real-time information for power quality and energy trending down to the motor level.
    - Evaluate for possible elevated arc-flash locations and recommendation for mitigation.

The performance evaluations results will be documented in a draft technical memorandum (TM). Following the workshop in Task 4.2, the final TM will be developed incorporating City comments and submitted for project record.

Task 4.2 – Performance Evaluation Results Review (PHASE 2)

Once the performance evaluations have been completed for all facility and pipeline assets, a 4-hour workshop (**Workshop No. 3**) will be held to discuss the findings and results. The draft TM from Task 4.1 will also be discussed during this workshop and comments from the City will be incorporated into the Final TM.

Deliverable(s):

- *Draft and Final TM Water Plant and Distribution Performance Evaluation Summary*
- *Materials and Meeting Summary for Workshop No. 3*

TASK 5 – WATER MASTER PLAN UPDATE (PHASE 2)

Following condition assessments and performance evaluations in the previous tasks, as well as the review of potential climate change and associated sea level rise risks performed as part of this task below, Arcadis shall develop risk-based capital improvement alternatives. The alternatives will be incorporated into the Water Plan Update under this task. Task 5 is entirely funded in Phase 2.

Task 5.1 – Climate Change Impacts Review (PHASE 2)

As a coastal community, the City has to consider the impacts of climate change and its implications are integral to near and long-term planning. Recently, Arcadis completed a preliminary assessment of hazards associated with sea level rise, tidal flooding, storm surge flooding up to a Category 5 storm at high tide, and groundwater risk as part of our previously-conducted America's Water Infrastructure Act (AWIA) efforts. This task builds on that recent work and shall include review of the City's 2020 Citywide Vulnerability Assessment and Adaptation Plan (CVAAP) as well as other information available from Broward County's Climate Change Task Force and the regional Southeast Florida Climate Compact and incorporate into the Water Master Plan evaluations and planning. The analysis of the assets herein shall include inundation risk from sea level rise (SLR), storm surge (SS), and extreme precipitation (EP) as detailed and delineated in the CVAAP.

Following the climate change impact analysis, Arcadis shall incorporate the results and those from Task 3 and 4 into the risk evaluations conducted as part of Task 5.2 in order to align with assessments associated with condition, useful life, regulatory drivers, etc. to ensure the best decisions are being made at the right time. Finally, the prioritized assets will be developed into projects and alternatives in Task 5.2 and 5.3 which shall include the identification of limited design criteria (e.g. minimum elevations and locations) required to mitigate the anticipated impacts. In addition, the development of proposed projects to mitigate impacts for the existing assets will be completed as part of Task 5.3 as required including project schedule and cost estimates. The master plan update frequency based on the rate of projected climate change will also be recommended.

It is assumed that the City will provide Arcadis with the Citywide Vulnerability Assessment, inclusive of GIS shape files designating potentially at-risk geographic areas and the associated timing of such impacts. Arcadis shall overlay these files into our RRPS tool and configure a distinct failure mode in the RRPS as part of Task 5.2. Also, Sea Level Rise projections will be based on the 2019 update of the Unified Sea Level Rise Projection, Southeast Florida as prepared by the Southeast Florida Regional Climate Change Compact's Sea Level Rise Ad Hoc Work Group. Storm surge estimates shall be based on Category 3 events using standard data sets (e.g., NOAA, USACE, USGS, etc.).

Task 5.2 – Asset Risk Evaluations (PHASE 2)

Risk is defined as the product of the Likelihood of Failure (LoF) and Consequence of Failure (CoF). Arcadis shall assign a LoF and a CoF score to all assets in a range from 1 (low) to 5 (high). Therefore, the Risk score will range from 1 (1X1) to 25 (5X5). Arcadis scores each asset based on its LoF and CoF scoring, as finalized with the City. The LoF scoring is based on physical and performance condition assessment performed in the previous tasks. The CoF scoring includes triple bottom line factors related to financial, social, and environmental consequences of an asset failure. Pipeline CoF factors are typically based on diameter, depth, demand or pressure shortfall, proximity to major roads, railroads, environmentally sensitive areas and other natural or built structures that would be affected by a failure. Facility CoF factors are typically based on replacement cost, staffing requirements, potential for illness or injury, magnitude of disruption, product quality, permit compliance, and required response time. Results from the recently-completed risk and resilience assessment and Task 5.1 will be

used to develop the CoF criteria. GIS spatial relationship are used to assign scores for the proximity and therefore require appropriate reference layers. Facility CoF scoring is performed through an interview process and document review.

A redundancy factor can be applied where multiple assets supporting the same process can afford some level of failure and still meet service levels. A redundancy factor >0 and <1 serves as a multiplier to reduce the CoF score. If no redundancy exists, this factor is set to 1.

The specific CoF and redundancy factors and supporting information will be defined through a workshop facilitated by Arcadis. Each asset will be assigned CoF scores for their related factors within the RRPS tool. Each asset will receive a final overall CoF score based on the maximum score from their individual factors and the redundancy.

The asset risk evaluation includes:

- CoF Workshop (**Workshop No. 4**) – Arcadis shall facilitate a 4-hour workshop for the pipeline and facility assets. The purpose of this workshop is to present and finalize methodology for scoring asset consequence of failure and related redundancy. Input from the City during the workshops will be incorporated into the final methodology.
- Perform Risk Scoring – The CoF scoring from this task and the LoF scoring from Tasks 2, 3 and 4 will be used to produce a Risk score ranging from 1 (low) to 25 (high) for each asset. This will represent the current risk profile and will serve as the principal means to prioritize capital planning.
- Risk Results Workshop (**Workshop No. 5**) – Once the risk results are completed, a 4-hour workshop will be held with City staff to review the results and understand which assets need attention due to risk in addition to end of life. Similar to the condition results review, a Microsoft Power BI interface to the RRPS tool will be used to visualize the data in five-year increments and over the next 20 years by geography or process area to facilitate discussions on needs and the scoring accuracy.

Deliverable(s):

- *Materials and Meeting Summary for Workshops No. 4 and No. 5*
- *Draft and Final Risk Scoring Summary*

Task 5.3 – Project Alternatives Analysis and Cost Estimates (PHASE 2)

Conceptual design alternatives will be developed, and business case evaluations will be completed based upon the asset condition and risk score results as well as the optimization opportunities identified. The business case will identify the project need, the alternatives considered and evaluated through a life cycle costs evaluation, the selected alternative cost and schedule, and document any condition or risk assessment data evaluated. For pipeline assets, the pipelines will be grouped by risk score, replacement year, and geography to identify specific pipes requiring replacement due to growth and condition. Unit costs per pipe diameter for all pipes will be estimated at a conceptual planning level to identify the CIP funding needs for pipelines. Recent City bids for pipeline construction as well as Arcadis databases will be used as a basis for the costs. All opinions of probable cost will be consistent with the Association for the Advancement of Cost Estimating (AACE) Class 5 estimates with contingencies appropriate to the degree of design development. Cost estimates will be developed primarily at the individual assets level. However, where appropriate, project level costs will be developed for major projects.

Arcadis will hold two, 4-hour alternatives review workshops with the City (**Workshops No. 6 and No. 7**) to review the major alternatives evaluated for WTP process improvements and linear assets respectively to achieve the LOS and efficiency goals. For pipelines, the review will focus on annual funding needs for various service level

scenarios to select the best fit for the City balancing funding, condition and risk objectives. Comments from the City will be incorporated into the final selection of alternatives.

Deliverable(s):

- *Materials and Meeting Summary for Workshops No. 6 and No. 7*

Assumption(s):

- *Alternatives evaluations will be provided for up to five (5) major proposed projects.*
- *Business case evaluations will be completed for up to 20 proposed projects.*

Task 5.4 – Water Master Plan (PHASE 2)

Arcadis shall compile results into a Water Master Plan Report incorporating all of the work from the previous tasks in to a draft and final report for review by the City. A preliminary table of contents for the report is as follows:

- Executive Summary
- Introduction and Background
- Characterization of Existing System
- Water Supply and Demand Projections
- Water Distribution System Modeling
- Regulatory Review and Water Quality Evaluation
- Climate Change Impacts Review
- Water Supply Capacity, Equipment Condition and Risk Assessment
- Water Treatment Capacity, Equipment Condition and Risk Assessment
- Water Distribution System Desktop Condition and Risk Assessment
- Capital Improvements Plan (including schedules and cost estimates)

A 4-hour workshop (**Workshop No. 8**) will be held to review the Draft Water Master Plan Report. The City will review the draft submittal within 15 business days and provide written comments. Arcadis will schedule and conduct a workshop to review the draft submittal and comments with the City. Discussion and comments received at the workshop will be incorporated into the Final Water Master Plan and submitted for project close-out.

Deliverable(s):

- *Draft and Final Water Master Plan Report*
- *Materials and Meeting Summary for Workshop No. 8*

Task 5.5 – Living Master Plan Decision Support (RRPS) Tool (PHASE 2)

Arcadis shall provide the RRPS tool to the City including two training sessions and a user's manual so the database can be updated on a regular basis as conditions may change in terms of growth or extreme events. This allows for revisions to the inputs that support the Master Plan recommendations and be used to reprioritize existing CIP projects or identify new projects for including in CIP planning.

This tool requires basic skills in GIS to successfully change model assumptions or add new data from condition and risk assessments and rerun the outcomes. Arcadis will coordinate training sessions for the City staff to perform these updates. The first training session will cover all tasks a typical end-user would perform, including loading data, setting CIP parameters, defining cohort aging degradation, running funding scenarios and reviewing

results. The second training session should be held two to four weeks later after City staff have used the tool. The second session will review the tool usage, address questions that arose after the first session and review how RRPS is integrated with a source system like Cityworks.

Deliverable(s):

- *Arcadis RRPS tool installation for use on up to five City computers.*
- *Microsoft Access RRPS results database*
- *Power BI template with full risk results*
- *RRPS User and Administrator Guide manual.*
- *RRPS Configuration document specific to the settings made for the City.*
- *Two, six-hour Training Sessions for City staff.*

Assumption(s):

- *Availability of at least one City IT resource with detailed Cityworks, ArcGIS and SQL Server knowledge to facilitate setup and integration.*
- *ArcGIS 10.7 or higher desktop software is installed.*
- *Microsoft Power BI 2.84.981.0 or higher is installed.*
- *While the Master Planning tasks do take into consideration climate change and the potential associated sea level rise impacts as part of our risk analysis which ultimately drives development and prioritization of projects, it should be noted that detailed modeling for sea level rise/storm surge potential is not included and Arcadis shall rely upon the results of readily-available information as well as the recently-completed Citywide Vulnerability Assessment to be provided by the City.*

SCHEDULE

The project schedule in Figure 1 includes services that span both Phase 1 and 2 and is progressed through February 2022. The Phase 2 work will be completed 35 weeks after ATP.

Arcadis shall continue work on Phase 1 and transition into Phase 2 upon receipt of written authorization (e.g. ATP Phase 2) from the City which is scheduled to occur no later than March 31, 2022.

Project Tasks	Estimated Duration to Completion from Phase 2 ATP (3/31/2022)
Task 1 – PROJECT MANGEMENT (On-going to Completion)	35 weeks
Task 4 – WATER PLANT PERFORMANCE EVALUATION	15 weeks
Task 5 – WATER MASTER PLAN UPDATE	35 weeks

Notes:

1) The preliminary project milestones are based on normal working schedules. Travel and schedule restrictions caused by national, state, and local government directives (e.g. Covid-19) may impact this schedule.
2) Project management activities will be performed throughout the duration of the project.
3) The schedule assumes the City will review and provide comments on deliverables within 15 business days.

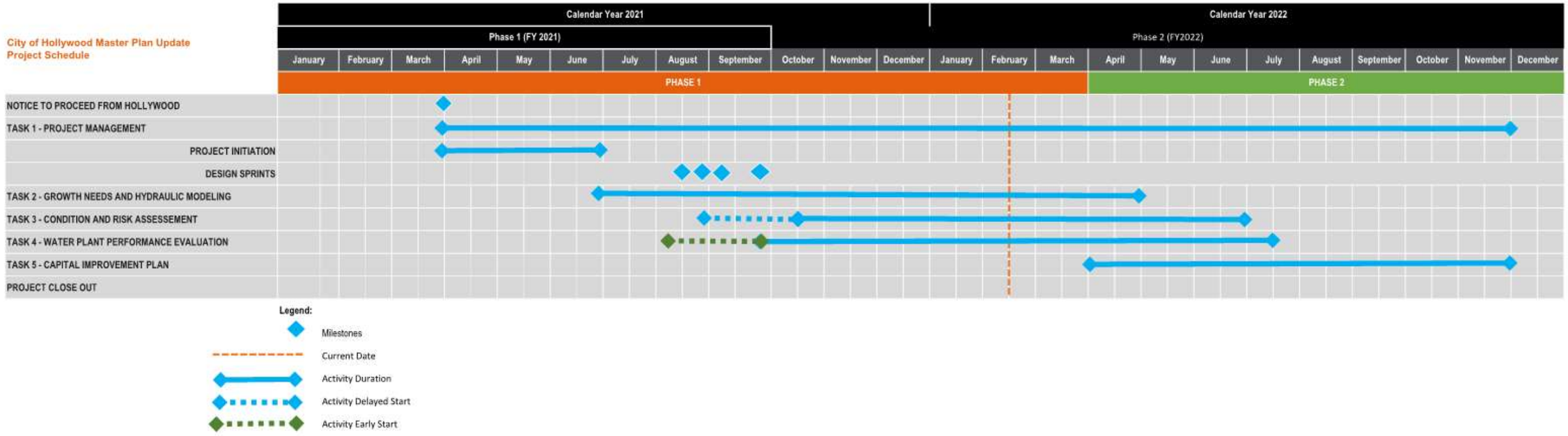

Figure 1- Preliminary Project Phasing Timeline

BUDGET AND INVOICING

The terms of compensation shall be in conformance with the terms of the Agreement "Professional Services Agreement, Water Master Plan, dated March 18, 2021 between the City and Arcadis U.S., Inc. The total Not-to-Exceed (NTE) fee for this project under Phase 2 is $537,140. A breakdown of this NTE fee is enclosed as Attachment A and B. The project will be billed monthly.

The following presents a summary of the scope of services and funding allocations for Phase 2 only. For detailed breakdown by tasks, refer to Attachments A and B. Attachment C provides our subconsultant team members' task order proposals.

Task	Phase 2 – FY2022
Task 1 – PROJECT MANGEMENT AND INITIATION	$72,426.00
Task 4 – WATER PLANT PERFORMANCE EVALUATION	$54,154.00
Task 5 – WATER MASTER PLAN UPDATE	$410,560.00
Total	$537,140.00

Note: This fee assumes that Phase 2 ATP is issued no later than March 31, 2022 so that work budgeted between Phase I (ATP Issued 3/31/21) and Phase 2 are allowed to proceed without funding stops.

Attachment A
Detailed Fee Breakdown by Subtask

TASK NO	TASK DESCRIPTION	PHASE 2 ARCADIS	PHASE 2 McKim&Creed	PHASE 2 Tobon Eng.	PHASE 2 ODC	PHASE 2 Subtotal	Total
Task 1	**PROJECT MANGEMENT AND INITIATION**	**$ 54,850**	**$ 13,375**	**$ 4,211**	**$ 320**	**$ 72,756**	**$ 72,756**
1.1	Project Management and Administration						
1.2	Data Collection and Request for Information (RFI)						
1.3	Kick-off and Visioning/Goal Setting Workshop						
Task 4	**WATER TREATMENT PLANT PERFORMANCE EVALUATION**	**$ 40,440**	**$ 11,732**	**$ 1,504**	**$ 148**	**$ 53,824**	**$ 53,824**
4.1.1	Future Regulatory Summary						
4.1.2	Water Quality Performance Evaluation						
4.1.3	Treatment Capacity and Hydraulic Evaluation						
4.1.4	Reliability and Redundancy Evaluation						
4.1.5	Chemical Storage and Feed Systems Evaluation						
4.1.6	Energy and SCADA Optimization	$ 7,360					
4.1.7	Utilities Evaluation	$ 5,440					
4.2	Condition Assessment and Performance Evaluation Results	$ 27,640					
Task 5	**WATER MASTER PLAN UPDATE**	**$ 348,340**	**$ 51,206**	**$ 9,024**	**$ 1,990**	**$ 410,560**	**$ 410,560**
5.1	Climate Change Impacts Review	$ 6,600					
5.2	Asset Risk Evaluations (Prioritized CIP)	$ 81,060					
5.3	Project Alternatives Analysis and Cost Estimates	$ 110,970					
5.4	Water Master Plan Compilation	$ 107,590					
5.5	Living Master Plan Decision Support (RRPS) Tool	$ 42,120					
	Subtotal	$ 443,630	$ 76,313	$ 14,739	$ 2,458		

	Phase 2
Subtotal Phase	$ 537,140
Total By Phase	**$ 537,140**

		Contract Labor Category	Hours	Billing Rate ($ / hr)	Cost	Fee / Task	Total Fee
							$ 537,140.00
					Arcadis Labor	$ 443,630.00	
					Subconsultant Costs	$ 91,052.00	
					Other Direct Expenses	$ 2,458.00	
1	**Project Management and Initiation**						$ 72,756.00
	Labor Subtotal					$ 54,850.00	
	Melissa Pomales, P.E.	Senior Officer	8	$ 280.00	$ 2,240.00		
	Leah Richter, P.E.	Company Officer	18	$ 240.00	$ 4,320.00		
	Celine Hyer, P.E.	Technical Expert	24	$ 240.00	$ 5,760.00		
	Jim Cooper, P.E.	Technical Expert	2	$ 240.00	$ 480.00		
	Rebecca Slabaugh, P.E.	Technical Expert	44	$ 240.00	$ 10,560.00		
	Greg Osthues, P.E.	Technical Expert	16	$ 240.00	$ 3,840.00		
	Tung Nguyen P.E.	Project Manager	118	$ 220.00	$ 25,960.00		
	Lia Dombroski	Project Engineer 2	13	$ 130.00	$ 1,690.00		
	Subcontractor Labor Subtotal					$ 17,586.00	
	McKim & Creed				$ 13,375.00		
	Tobon Engineering				$ 4,211.00		
	Other Direct Expenses					$ 320.00	
	Travel	(airfare, hotel, etc.)			$ 145.00		
	Miscellaneous Expenses	(reproduction, postage, other)		$ -	$ 175.00		
4	**Water Treatment Plant Performance Evaluation**						$ 53,824.00
	Labor Subtotal					$ 40,440.00	
	Celine Hyer, P.E.	Technical Expert	4	$ 240.00	$ 960.00		
	Principle Engineer QAQC	Technical Expert	8	$ 240.00	$ 1,920.00		
	Rebecca Slabaugh	Technical Expert	12	$ 240.00	$ 2,880.00		
	Brian Duane, P.E.	Technical Expert	16	$ 240.00	$ 3,840.00		
	Tung Nguyen P.E.	Project Manager	40	$ 220.00	$ 8,800.00		
	Sean Chaparro, P.E.	Senior Engineer	42	$ 200.00	$ 8,400.00		
	Joan Fernandez, P.E.	Lead Engineer	32	$ 220.00	$ 7,040.00		
	Chris Heltzel	Lead Engineer	4	$ 220.00	$ 880.00		
	Project Engineer 2	Project Engineer 2	44	$ 130.00	$ 5,720.00		
	Subcontractor Labor Subtotal					$ 13,236.00	
	McKim & Creed				$ 11,732.00		
	Tobon Engineering				$ 1,504.00		
	Other Direct Expenses					$ 148.00	
	Travel	(airfare, hotel, etc.)			$ 147.90		
	Miscellaneous Expenses	(reproduction, postage, other)		$ -	$ -		
5	**Water Master Plan Update**						$ 410,560.00
	Labor Subtotal					$ 348,340.00	
	Melissa Pomales, P.E.	Senior Officer	16	$ 280.00	$ 4,480.00		
	Leah Richter, P.E.	Company Officer	21	$ 240.00	$ 5,040.00		
	Celine Hyer, P.E.	Technical Expert	130	$ 240.00	$ 31,200.00		
	Jim Cooper, P.E.	Technical Expert	8	$ 240.00	$ 1,920.00		
	Rebecca Slabaugh	Technical Expert	60	$ 240.00	$ 14,400.00		
	Brian Duane, P.E.	Technical Expert	16	$ 240.00	$ 3,840.00		
	Chris Matthews	Technical Expert	80	$ 240.00	$ 19,200.00		
	Greg Osthues	Technical Expert	8	$ 240.00	$ 1,920.00		
	Tung Nguyen P.E.	Project Manager	76	$ 220.00	$ 16,720.00		
	Senior Engineer Modeling	Senior Engineer	28	$ 200.00	$ 5,600.00		
	Sean Chaparro, P.E.	Senior Engineer	148	$ 200.00	$ 29,600.00		
	Joan Fernandez, P.E.	Lead Engineer	228	$ 220.00	$ 50,160.00		
	Chris Heltzel	Lead Engineer	200	$ 220.00	$ 44,000.00		
	Senior Engineer Resiliency	Senior Project Engineer	32	$ 180.00	$ 5,760.00		
	Andrea Guzman	Chief Technician	65	$ 150.00	$ 9,750.00		
	Lauren DaCunha	Project Engineer 2	62	$ 130.00	$ 8,060.00		
	Anusha Kadudula	Project Engineer 1	80	$ 115.00	$ 9,200.00		
	Project Engineer 2	Project Engineer 2	196	$ 130.00	$ 25,480.00		
	Lia Dombroski	Project Engineer 2	437	$ 130.00	$ 56,810.00		
	Seth Anderson	Project Engineer 2	40	$ 130.00	$ 5,200.00		
	Subcontractor Labor Subtotal					$ 60,230.00	
	McKim & Creed				$ 51,206.00		
	Tobon Engineering				$ 9,024.00		
	Other Direct Expenses					$ 1,990.00	
	Travel	(airfare, hotel, etc.)			$ 290.00		
	Miscellaneous Expenses	(reproduction, postage, other)		$ -	$ 1,700.00		

Attachment C

Subconsultant Proposals

Note:
1) Lump Sum Proposals for both Phase 1 and 2.
2) Refer to Attachment A for sub-consultant fee allocations by Phase and Sub-task.

McKIM&CREED

ENGINEERS

SURVEYORS

PLANNERS

SCOPE OF SERVICES
for
CITY OF HOLLYWOOD
WATER MASTER PLAN ELECTRICAL AND I&C SERVICES
to
ARCADIS INC.

McKim & Creed will provide services pertaining to the electrical, instrumentation and SCADA equipment, for the City of Hollywood Water Master Plan.

These services are outlined in Exhibit 1 Scope of Work of the "Master Plan Updated Scope", from Arcadis to the City of Hollywood. McKim & Creed's tasks and fees are shown as a separate attachment to this document.

Please feel free to contact Aubrey Haudricourt, project manager, for any questions.

Thank you.

A.Haudricourt, PM

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Task No.	Task Description		McKim
Task 1	**PROJECT MANGEMENT AND INITIATION**	$	33,437
1.1	Project Management and Administration	$	20,317
1.2	Data Collection and Request for Information (RFI)	$	4,920
1.3	Kick-off and Visioning/Goal Setting Workshop	$	8,200
Task 3	**CONDITION ASSESSMENT**	$	33,391
3.1	Condition Assessment Standards for Vertical and Linear Assets	$	1,028
3.3	Facility Condition Assessment Data Gathering (in plant & remaining facilities)	$	30,723
	Condition Assessment and Performance Evaluation Results Virtual Meeting	$	1,640
Task 4	**WATER TREATMENT PLANT PERFORMANCE EVALUATION**	$	46,927
4.1	Draft Section on Energy, SCADA Optimization, and Utilities evaluation	$	36,960
4.2	Condition Assessment and Performance Evaluation Results		
	Performance Evaluation Results Review Workshop	$	2,367
	Final Section on Energy, SCADA Optimization, and Utilities evaluation	$	7,600
Task 5	**WATER MASTER PLAN UPDATE**	$	51,206
5.1	Asset Risk Evaluations (Prioritized CIP)	$	10,402
	CoF and Risk Results Workshops	$	5,000
5.2	Project Alternatives Analysis and Cost Estimates	$	19,201
	Alternatives Workshop	$	5,000
5.3	Water Master Plan Compilation	$	6,402
	Draft Master Plan Workshop	$	5,201
	TOTAL WATER MASTER PLAN FEE	$	164,961

McKIM&CREED

SCOPE OF SERVICES

Tobon Engineering referred to as (SUBCONSULTANT) shall perform the engineering Scope of Services as described herein.

INTRODUCTION

City of Hollywood (City) entered into an agreement with Arcadis to provide engineering services in support of its water system. This Scope of Services for the SUBCONSULTANT is to provide services related to a water master plan (WMP) for the existing water service areas served by the City of Hollywood Public Works Department.

SCOPE OF SERVICES

Arcadis will furnish professional engineering services for the overall project management, project initiation, condition assessment, water plant performance evaluation, and compilation of CIP proposals into a comprehensive WMP update though 2040. Subconsultant will assist Arcadis in the development of the WMP thru involvement in the following tasks as listed in the scope between the City and Arcadis:

1. Project Management and Initiation (Task 1)
2. Hydraulic Modeling, Future Demand Projections and Water Supply Evaluation (Task 2)
3. Condition Assessment (Task 3)
4. Water Plant Performance Evaluation (Task 4)
5. Water Master Plan Update (Task 5)

Tobon Engineering shall provide the specific following scope of services in assisting Arcadis in the development of the WMP, subtasks shown, and numbering are from the scope of work between the City and Arcadis.

Task 1 Project Management and Initiation

Task 1.1 Project Management and Administration (Phases 1 & 2)

Provide monthly project status updates and participate in calls with the City as needed for a project duration of 67 weeks under two phases.

Task 1.2 Data Collection and Request for Information (RFI) (Phase 1)

Review design reports, studies, GIS and/or performance assessments of the water facilities that characterize the existing condition and enhancement needs for various system components.

Task 1.3 Project Initiation – Kick-off and Visioning/Goal Setting Workshop (Phase 1)

Advise and participate in the visioning/goal setting and kick-off workshops which will review the scope, schedule, budget, and roles and responsibilities.

TASK 2 - HYDRAULIC MODELING, FUTURE DEMAND PROJECTIONS, AND WATER SUPPLY EVALUATION

Task 2.1 – Hydraulic Model Update and Calibration (Phase 1)

The purpose of this task is to bring the model up-to-date with current conditions within the system and bring the model to a level of detail aligned with current industry trends. Arcadis will update the existing City of Hollywood Water Distribution System Model (2018) to reflect recent distribution system improvements. The subconsultant will review and advise on the following tasks which include:

- Model Demand Allocation - Arcadis will review current customer demand information and integrate the demand into the water model. Arcadis shall review City provided water usage data to update demand patterns for existing customers and projections for future supply needs.
- Model Calibration - Arcadis shall re-calibrate the City's Infowater model to current industry standards utilizing pump curves, pumping schedules, tank level and supervisory control and data acquisition (SCADA) data.
- Field Data Collection – Arcadis will utilize flow testing and pressure data from the 1-week period of field data collection that will take place in coordination with the City's operations staff. A field data collection plan will be provided for the City

Task 2.2 – Review Existing Available Planning Data (Phase 2)

Assist Arcadis in the review of existing planning documents and readily available published data including: the previous City of Hollywood water demand projections from the latest Water Supply Plan, University of Florida Bureau of Economic and Business Research (BEBR) population projections for Broward County, US Census Bureau data, Regional Planning Commission data, City and County Utility Analysis Zone (UAZ) data, building permit and development requests, land use and future land use maps, and the latest Comprehensive Plan.

Task 2.3 – Water Supply Evaluation (Phase 1)

Advise and assist with the development of alternatives using design standards and the Objectives and Policies from the City, compared to existing scheduled CIP projects, and prioritizing solutions in

coordination with the City. Participate in discussions with the City on current water quality issues and operational challenges in the distribution system, including the manual operation of the WHPS and challenges for operating the WHPS and HSPS at the same time. Capital projects and/or operational improvement alternatives will be identified as part of the evaluation to mitigate or address water quality and operational issues.

TASK 3 – CONDITION ASSESSMENT

Task 3.1 – Condition Assessment Standards for Vertical and Linear Assets (Phase 1)

Participate in a 4-hour workshop (Workshop No. 2) with the City to discuss the standards and scoring for desktop pipeline condition assessments as well as the detailed facility (field) condition assessments at the wellfields, WTP, distribution storage, and distribution pumping facilities.

Task 3.2 - Desktop Condition Assessment for Linear Assets (Phase 1)

Assist and review the desktop pipeline condition assessment which will include an analysis of age, materials, diameters and past break history to understand potential factors causing failures such as corrosive soils, high groundwater tables, pressure surges, and etc.

TASK 4 – WATER PLANT PERFORMANCE EVALUATION (Phases 1 & 2)

Assist and review the Distribution System Performance Evaluation work product. The performance condition assessment to address the additional failure modes beyond mortality will be conducted through staff interviews and a review of relevant documents and data collected during the Task 1 data review as well as field and desktop evaluations.

TASK 5 – WATER MASTER PLAN UPDATE

Task 5.1 – Asset Risk Evaluation (Phase 2)

Assist in the development of conception design alternatives. Subconsultant will participate in Workshop No. 11 and 12 and will review workshop summaries and results.

Task 5.3 – Water Master Plan Compilation (Phase 2)

Arcadis will compile results into a Water Master Plan Report with schedules and budget incorporating all of the work from the previous tasks, a draft and final master plan report will be written that includes the following chapters:

- Executive Summary
- Introduction and Background
- Characterization of Existing System
- Regulatory Review
- Water Production and Demand Projection

- Water Distribution System Modeling
- Water Treatment Capacity Equipment Condition and Risk Assessment
- Water Distribution System Desktop Condition and Risk Assessment
- Recommended Improvements
- Cost Evaluation and Schedule for Proposed Improvements Over 10 Years

Subconsultant will review all draft and final work products associated with the Water Master Plan Report, make comments, recommendations and edit, as necessary.

Lump Sum Fee	$ 45,496
Reimbursable Expenses	$ 200
Total Lump Sum Fee	$ 45,696

ASSUMPTIONS

1. Total duration of services is 67 weeks and two phases.
2. Meeting minutes shall be prepared by others.
3. Arcadis is responsible for obtaining all data and GIS files needed for analysis and development of draft and final deliverables graphics and reports.
4. Subconsultant will rely on Arcadis and the City for accuracy of GIS and other data necessary for the completion of the tasks listed above.

Tobon Engineering

Hollywood Water Master Plan Hourly Manpower Breakdown

Task Number	Task Description	Subtask Hours	Task Total Labor Hours
1	PROJECT MANAGEMEMENT AND INITIATION		
	Task 1.1 Project Management and Administration 15 months	32	
	Task 1.2 Data Collection and Request for Information (RFI)	16	
	Task 1.3 Project Initiation – Kick-off and Visioning/Goal Setting Workshop	8	
			56
2	HYDRAULIC MODELING, FUTURE DEMAND PROJECTIONS, AND WATER SUPPLY EVALUATION		
	Task 2.1 – Hydraulic Model Update and Calibration	48	
	Task 2.2 – Review Existing Available Planning Data	24	
	Task 2.3 – Water Supply Evaluation	40	
			112
3	CONDITION ASSESSMENT		
	Task 3.1 – Workshop No. 7 and 8 - Condition Assessment Standards for Vertical and Linear Assets	6	
	Task 3.2 - Desktop Condition Assessment for Linear Assets	4	
			10
4	WATER PLANT PERFORMANCE EVALUATION	16	16
5	WATER MASTER PLAN UPDATE		
	Task 5.1 – Asset Risk Evaluation	16	
	Task 5.3 – Water Master Plan Compilation	32	
			48
	Total Hours		242
	Hourly Rate		$188
	Labor Total		**$45,496**
	Reimbursable Expenses		**$200**
			.
	Total Fee		**$45,696**