Leading the Way

June 17, 2021

Attn: Talia Baker
PRC, Administrative Support
Dept. of Enterprise Services
Engineering & Architectural Services
PO Box 41476
Olympia, WA 98504-1476

SUBJECT: **CITY OF KENNEWICK – WWTP PHASE 2 UPGRADES PRC APPLICATION TRANSMITTAL**

Dear Members of the Project Review Committee:

Attached you will find the City of Kennewick's application to the Project Review Committee (PRC) to use the Progressive Design-Build (PDB) project delivery method for the City's Wastewater Treatment Plant (WWTP) Phase 2 Upgrades. This project is a solid candidate for PDB and meets the criteria identified in RCW 39.10.300. The reasons why this project is well suited for PDB include:

1. Critical Infrastructure: The WWTP serves the entire population of the City of Kennewick including many commercial and industrial businesses. The PDB delivery method allows for selection that is focused on qualifications and past experience on similar projects, which better ensures that this facility will operate within the permit limits and mitigate the odor problems currently being experienced.
2. Innovation: The City is interested in implementing an innovative solids management concept that is unique for WWTPs in this region of the country. The lack of existing facilities and lack of technical literature for the sizing of such facilities will necessitate sharing of risk between the City, designer, and builder. In order to manage risk, the City staff has visited a recently completed and similar project in Pasco, Florida and has performed pilot testing to ensure that the approach meets the intended goals and purposes of the project.
3. Collaboration: The City is willing to forego some automation in order to reduce project costs. The balancing of operational effort and cost reduction will require significant collaboration during scoping and design development and construction between the City and PDB Contractor team. The collaboration and PDB process enables the City to meet its goals.

Thank you for your consideration, input and recommendations of our application to use the PDB approach for this critical project. We look forward to the opportunity to share more about this project at the PRC meeting on July 22, 2021. If you need any additional information in advance of that meeting, please contact our Project Manager, Jeremy Lustig, at (509) 585-4413.

PUBLIC WORKS

1010 E. Chemical Drive • PO Box 6108 • Kennewick, WA 99336-0108
(509) 585-4301 • Fax (509) 585-4451 • john.cowling@ci.kennewick.wa.us

Leading the Way

Sincerely,

John A. Cowling, P.E.
Utility Services Manager

Enclosures: City of Kennewick PDB Application, Including Attachments

JC:kp

cc/ec: Cary M. Roe, P.E., Public Works Director
Jeremy J. Lustig, P.E., Utilities Capital Projects Engineer
Sandra Quandt, Contracts/Office Administrator – P1605

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State of Washington
Capital Projects Advisory Review Board (CPARB)
PROJECT REVIEW COMMITTEE (PRC)

APPLICATION FOR PROJECT APPROVAL

To Use the Progressive Design-Build (PDB)
Alternative Contracting Procedure

The CPARB PRC will only consider complete applications: Incomplete applications may result in delay of action on your application. Responses to sections 1-7 and 9 should not exceed 20 pages *(font size 11 or larger)*. Provide no more than six sketches, diagrams or drawings under Section 8.

Identification of Applicant

a) Legal name of Public Body (your organization): City of Kennewick
b) Address: PO Box 6108, 210 W. 6th Ave., Kennewick, WA 99336
c) Contact Person Name: John A. Cowling, P.E. Title: Utility Services Manager
d) Phone Number: 509-585-4301 E-mail: john.cowling@ci.kennewick.wa.us

1. Brief Description of Proposed Project

a) Name of Project: WWTP Phase 2 Upgrades
b) County of Project Location: Benton
c) Please describe the project in no more than two short paragraphs. *(See Attachment A for an example.)*

The City of Kennewick owns and operates a Wastewater Treatment Plant (WWTP) that serves the population of approximately 82,000. A Facility Plan was completed for the WWTP in 2014 and amended in 2021 which identifies three phases of improvements. The Phase 2 upgrades focus on biosolids management at the WWTP. Currently, solids are stored in lined lagoons. When the storage lagoons become full, the City issues a call for bids for a contractor to dredge out the solids and dispose of them – the solids are typically land applied on dryland crops that are managed as beneficial use facilities. The solids storage ponds are a source of significant odors and the City is interested in conditioning the solids to meet Ecology's Class A criteria which will open up disposal options and potentially create a marketable product.

The City is interested in using an innovative approach to condition the solids to meet Class A criteria – based on a recent and successful implementation of the technology in Pasco County, Florida. The City has visited the site, performed pilot testing, and is confident that this approach meets their intended goals and purpose. It involves dewatering the solids, drying and conditioning in greenhouses, further drying in a thermal dryer and pasteurization to meet Class A criteria. A robust ventilation and odor control system will manage foul air. Greenhouse heating will maintain functionality during the winter months.

2. Projected Total Cost for the Project:

A. Project Budget

Costs for Professional Services (A/E, Legal etc.)	$ 3,145,737
Estimated project construction costs *(including construction contingencies)*:	$24,194,251
Equipment and furnishing costs	$
Off-site costs	$
Contract administration costs (owner, cm etc.)	$ 186,000
Contingencies (design & owner)	$
Other related project costs (briefly describe)	
Sales Tax	$ 1,600,568
Total	$**29,126,556**

B. Funding Status

Please describe the funding status for the whole project. *Note: If funding is not available, please explain how and when funding is anticipated*

The City applied for and was granted $2M in funding for design of Phase 2 from the Department of Ecology. A portion of this funding was used to pay for the pilot testing. At the time of the funding

application, the City was planning on following the Design-Bid-Build process. After discussing the project with both the Department of Ecology and Department of Commerce, both entities agreed that PBD was the best option for the project. Their recommendation was to utilize the existing design funding the extent possible, return any remaining funds and submit a new application for the entire PDB process. If the CPARB approves this project for PDB, the City will return the balance of the 2M to Ecology and submit a new application for full funding from the Department of Ecology Water Quality Combined Funding Program. Applications are due October 15, 2021 and the draft funding offer list is expected to be announced in January 2022. The City desires to complete the CPARB/PRC application process in advance support this funding request.

3. Anticipated Project Design and Construction Schedule

Please provide *(See Attachment B for an example schedule.)*:
The anticipated project design and construction schedule, including:

a) Procurement;
b) Hiring consultants if not already hired; and
c) Employing staff or hiring consultants to manage the project if not already employed or hired.

The anticipated project milestones are as follows:

• Procure PDB Owner Advisor Consultant	Completed – J-U-B
• Submit CPARB Project Review Committee Applications	6/21/21 by 4 p.m. pst
• CPARB Project Review Committee Presentation	7/22/21
• Ecology Funding Application	10/15/21
• Ecology Funding Announcements	1/15/21
• DB RFQ Announcement	May 2022
• DB SOQs Due	June 2022
• RFP Announce/Shortlist (3 max)	July 2022
• Proposals Due	August 2022
• Selection	September 2022
• NTP	November 2022
• Start Construction	March 2023

4. Explain why the PDB Contracting Procedure is Appropriate for this Project

Please provide a detailed explanation of why use of the contracting procedure is appropriate for the proposed project. Please address the following, as appropriate:

- If the construction activities are highly specialized and a DB approach is critical in developing the construction methodology (1) What are these highly specialized activities, and (2) Why is DB critical in the development of them?

A. The City of Kennewick considered multiple procurement and delivery methods for this project including traditional design bid build, CMGC, Design-Build and Progressive Design-Build (PDB). Due to the nature of the unique process and approach to this project and the limited number of this type of facility, and the need to prepare a well-defined scope of work and plan between the City and Contractor, the integrated (Design and Build) Progressive Design-Build approach was selected to achieve the City's goals and needs. The City is committed to providing the necessary resources internally and augment their team with consulting support familiar with the alternative delivery method to achieve their project goals which will include:

   a. Performance, prescriptive and technical requirements
   b. Functional and operational elements including site and vertical building requirements
   c. Safety and life/cycle requirements
   d. Target project budget

B. The proposed method of utilizing greenhouses, thermal dryer, and a pasteurizer is uncommon for municipal WWTPs in the United States producing Class A biosolids. The City isn't aware of any other facilities that take this approach other than the facility in Pasco County, Florida. The lack of existing facilities and lack of literature on how engineers can size such facilities makes it very risky to employ a traditional design-bid-build approach. As a result, the City made a site

visit to the fully functional Pasco County, FL facility in 2019, to better understand the project, approach, construction and post construction operations and cost. Photos from the visit can be found in Appendix D. The City also conducted pilot testing with a small-scale greenhouse at the Kennewick WWTP both in the Summer and the Winter.

C. The design of the greenhouse will be especially difficult because a heating system will need to be designed to maintain functionality during the winter months experienced in this region – unlike Florida. Moreover, the design of the ventilation and odor control system on the greenhouse is especially important to the City since a main driver for this project is odor control. Collaboration between the operations staff, designers and builders will result in a more effective design.

D. The pasteurization dryer is an uncommon piece of equipment that will need to be designed to ensure belt timing and movement achieves the parameters required to for the biosolids to be pasteurized and result in Class A.

E. The methods of operation and processing of the solids in the greenhouse will determine the size of the greenhouse necessary; therefore, collaboration using a PDB approach between the City Operations Staff, Builder with their selected qualified designer, will be critical for properly sizing the facility, phasing and scheduling, pricing earlier in the design development phase, ensuring long term operability and risk mitigation.

- If the project provides opportunity for greater innovation and efficiencies between designer and builder, describe these opportunities for innovation and efficiencies.

  There are several automated greenhouses and pasteurizers on the market; however, the equipment tends to be very expensive. The City is willing to omit some of the automation in favor of manual operation in order to reduce overall implementation and operational cost as well as simplify use and repair. The recommended PDB process provide an opportunity for greater collaboration between the City, designer, and builder will be essential in order to strike the right balance between project cost and operational cost.

  Because the ultimate objective of the City is to produce Class A solids, an innovative PDB team, as a single entity under one contract, may propose other innovative ideas in addition to greenhouses and pasteurizers for achieving the same result. Progressive Design-Build (PDB) will allow the City to work with the selected Design-Builder to evaluate options.
- If significant savings in project delivery time would be realized, explain how DB can achieve time savings on this project.

  Several of the pieces of equipment are likely to have very long lead times. PDB allows for advance procurement of any long-lead time equipment or materials.

5. Public Benefit

In addition to the above information, please provide information on how use of the DB contracting procedure will serve the public interest. For example, your description must address, but is not limited to:

- How this contracting method provides a substantial fiscal benefit; or
- How the use of the traditional method of awarding contracts in a lump sum *(the "design-bid-build method")* is not practical for meeting desired quality standards or delivery schedules.

A. By following the proposed two-stage selection process which is in the best interest of the City, the selection can be focused on qualifications, experience on projects of similar complexity, and project approach. Additionally, the Builder can integrate and encourage small business entities to participate in the work in accordance with the City's procurement guidelines. This is a benefit over traditional DBB delivery because it better ensures that the selected team will have the

experience, qualifications, and key personnel required for project success. This is especially critical on a project like this which includes unconventional treatment processes for a municipal WWTP of this size.

B. Because this is an unconventional way of handling solids at a municipal WWTP, this project involves more risk. In a DBB delivery, the contractor will either assume the risk and inflate pricing or minimize risk in order to be the low bidder. PDB allows the allocation of risk to be negotiated with the contractor as the City balances project goals and cost. This will lead to reduced project costs and a better end product.

C. The City is willing to sacrifice some automation in favor of manual operation in order to reduce project costs. Collaboration between the City operations staff, designers, and contractor will be vital in order to strike the correct balance between project cost and operational cost. This will lead to a reduced project cost and a facility that the City will feel comfortable operating.

D. The PDB team will be able to negotiate early work packages and procure long-lead equipment and materials sooner than in if the design had to be completed first.

E. Using the PDB approach on an unconventional project like this will reduce the number of change orders. This will reduce the overall project cost.

6. Public Body Qualifications

Please provide:

- A description of your organization's qualifications to use the DB contracting procedure.

  Kennewick Public Works Department manages an extensive network of infrastructure in Water, Wastewater, Roadways and Utilities and Storm Drain Collection systems. The City employs approximately 50 planning, design and operations staff to deliver and maintain this system.

  The City has hired J-U-B ENGINEERS, Inc. (J-U-B), a professional engineering firm that provides a team with the proven alternative project delivery experience to assist with the management and administration of the PDB procurement and project. J-U-B has performed the same scope of work for a variety of recent projects, as listed in Appendix B.

- A project organizational chart, showing all existing or planned staff and consultant roles.

  Note: The organizational chart must show the level of involvement and main responsibilities anticipated for each position throughout the project (for example, full-time project manager). If acronyms are used, a key should be provided. (See Attachment C for an example.)

  See Appendix A for the project organizational chart.

- Staff and consultant short biographies that demonstrate experience with DB contracting and projects (not complete résumés).

  Cary M. Roe, P.E.

  Public Works Director

  Relevant Experience: Cary is the Public Works Director for the City of Kennewick, a position he has held since 2014. As Public Works Director, Mr. Roe is responsible for the overall management of the Public Works operations, including the Engineering Division, Utility Services Division, Streets & Stormwater Division, Traffic Division, Development Review and Solid Waste & Recycling, as well as oversight of the $13.5 million Operations budget and the $25 million Capital Improvements budget. Responsibilities include administration of the design, construction and maintenance of City streets,

stormwater, water and sewer services, and traffic control. Cary has a broad range of experience in all aspects of capital projects over the last 30 years in both the municipal and private sectors.

John A. Cowling, P.E.

Utility Services Manager

Relevant Experience: John has over 24 years of experience. During that time John has worked for the Cities of Kennewick, Mountlake Terrace, Marysville and Sammamish as well in the private sector for Penhallegon Associated Consulting Engineers. John has worked as the division manager for multiple varying scale capital projects for Water, Wastewater, Stormwater and Transportation. Most recent projects include WWTP upgrades, Domestic Water Reservoirs, Sewer Collections Rehabilitation, Water Transmission Main replacement, Interstate overcrossing, Stormwater Regional Facilities, and various road widening and new construction projects.

Jeremy J. Lustig, P.E.

City Capital Projects Manager

Relevant Experience: Jeremy has over 24 years of experience. Jeremy has worked for the City of Kennewick, City of Henderson in Nevada, the Las Vegas Valley Water District, as well as the private sector for Post Buckley Schuh and Jernigan (PBS&J) Consulting Engineers. Jeremy has worked in several areas from Capital Project Delivery Engineer, to Water Operations Manager, to Master Planning Engineer. Most recent projects include potable water reservoir, sewer interceptor rehabilitation, and large diameter water transmission main; phase to include design, bidding, and construction.

Alex Fazzari, P.E.

PDB Procurement and Contracting Consultant – Project Manager

Relevant Experience: Alex has over 20 years of experience. Alex was the Project Manager for the City's WWTP Facility Plan as well as the Phase 1 Upgrades project. Alex has worked on several City of Kennewick design projects for both the water and wastewater utilities and knows City protocols, including Department of Ecology requirements for conducting wastewater projects.

Michael Lasko, P.E. (UT, NV, WA Pending)

PDB Procurement and Contracting Consultant – PDB Lead Procurement and Oversight Manager

Relevant Experience: Michael has over 32 years of experience. In that time, he was delivered alternative delivery projects of various sizes for over 25+ years in Transportation, Water and Wastewater on small <$5m, medium $5M to $50M and larger $50M to over a $1B. He has worked with Owners by leading the development of procurements to select and hire a Builder, served as a Design Manager and Construction Manager on major infrastructure projects. While in Nevada, Michael lead the development and passage of their first Design Build law enabling NDOT and Local Agencies to deliver projects that meet the State's rule when using alternative delivery.

Brett Converse, P.E., PhD

PDB Procurement and Contracting Consultant – Technical Advisor

Relevant Experience: Dr. Brett Converse has 30 years of experience in the planning and design of wastewater treatment facilities including cutting-edge research to implement innovative biological processes. Brett was one of the primary authors of the City's WWTP Facility Plan and evaluated alternatives for solids processing and disposal in Kennewick. Brett has vast experience with solids handling facilities at several WWTPs including management of a 1,200 acre ranch receiving biosolids from various municipalities and sewer districts in North Idaho.

Dan Ayers, P.E.

PDB Procurement and Contracting Consultant – Technical Advisor

Relevant Experience: Dan is currently working on two alternative delivery projects, the Spanish Fork WWTP upgrades which is a CMGC delivery, and Logan Biosolids Composting which is a design-build project. Dan Ayers has 34 years of experience in municipal wastewater treatment planning, design, and construction management. He is well versed in the application of a variety of treatment technologies including sludge digestion, sludge thickening, sludge dewatering, composting, and solids land application

- Provide the ***experience and role on previous DB projects*** delivered under RCW 39.10 or equivalent experience for each staff member or consultant in key positions on the proposed project. (*See Attachment D for an example. The applicant shall use the abbreviations as identified in the example in the attachment.)*

  See Appendix B for key team member experience and role on previous alternative delivery projects.

- The qualifications of the existing or planned project manager and consultants.

  Note: For design-build projects, you must have personnel who are independent of the design-build team, knowledgeable in the design-build process, and able to oversee and administer the contract.

  See above biographies for relevant information regarding qualifications of key team members. All team members are (and will be) independent of the PDB team.

- If the project manager is interim until your organization has employed staff or hired a consultant as the project manager indicate whether sufficient funds are available for this purpose and how long it is anticipated the interim project manager will serve.

  The City's Capital Projects Manager, Jeremy Lustig, P.E., is anticipated to actively manage and oversee the project until its completion.

- A brief summary of the construction experience of your organization's project management team that is relevant to the project.

  See Appendix B for relevant project experience.

- A description of the controls your organization will have in place to ensure that the project is adequately managed.

  The City of Kennewick's Public Works Department has established Project Management processes and controls. These systems have been key to the City's demonstrated ability to successfully manage and deliver public works projects on time and within budget – as demonstrated in Appendix C. Some of the Project Management processes at the City include:

  - ✓ Weekly coordination meetings for key staff members. Staff are expected to regularly update others on the status of their projects.
  - ✓ Weekly task force workshops throughout the design development phase.
  - ✓ Internal construction management staff capable of handling inspections, documentation, pay requests, and administration on projects of all sizes.
  - ✓ Strict budgetary controls and approval processes.

  The City has also engaged with J-U-B as an Owner Representative on the project. J-U-B's vast wastewater experience in managing projects combined with their alternative delivery experience makes

them a valuable asset to the project team and increases the team's effectiveness in managing this project.

- A brief description of your planned DB procurement process.

  The PDB procurement process will be based on a best value approach of qualitative factors and a price factor. We anticipate that we will use a two-stage procurement process. We will publicly announce a project RFQ, inviting qualified participants to submit qualifications. Submittals will be reviewed by the Selection Committee with technical analysis and input from J-U-B as needed. Based on the scoring of the submittals for the first stage, we will develop a shortlist (max 3 firms) who will be invited to submit proposals. At the RFQ stage, transparent, fair and non-discriminatory evaluation by the City's selection panel, with the support of its Owner's Representative J-U-B Engineers, will primarily be based upon experience, qualifications, and innovation. As a minimum, the RFQ will include/request the following:

  a. A general description of the project sufficient for proposers to submit qualifications.
  b. Outline of process the City will use to evaluate RFQs
  c. Proposer's audited accident prevention program
  d. Evaluation factors including technical (project management plan, audited safety record, approach (quality, design, value engineering, construction implementation and close-out), schedule and change and risk management), approach to a collaborative working environment between Owner/Builder, firm/team capability to perform including unique specialty services offered by the PDB team, past performance on recent relevant projects, promotion of business diversity (i.e. MWBE/small business utilization based on the State of Washington's OMWBE certification process, laws and Federal rules, and other factors.
  e. Protest requirements
  f. Price related factors.

  For the second phase, we will then issue RFPs to the shortlisted firms and select one firm based upon the scoring of the proposals. Up to two proprietary meetings will be held with each firm during the RFP development phase to allow the teams to receive input from the Selection Committee. J-U-B will provide technical consultation during this phase. Qualitative factors such as innovation, design efficiency, schedule, technical factors, meeting the Project Goals and exceeding expectations, and other published criteria will be the primary criteria for selection. The City is considering various options, including the utilization of small business entities, in determining the required selection criteria based on cost or other price related factors per RCW 39.10 (various sections).

  If multiple proposers are considered qualified and meet the City's goals, the City will consider the option to interview the short-listed firms prior to making their final selection.

- Verification that your organization has already developed (or provide your plan to develop) specific DB contract terms.

  The City and J-U-B will collaboratively work together to develop their contract requirements in accordance with their policies and rules, State rules and utilize the Engineers Joint Contract Documents Committee (EJCDC) Design-Build contract template. More specifically, this will include the contract terms and conditions using a modified standard DB 530 agreement and 535 general conditions. J-U-B will work together with the City to prepare and tailor the RFQ and RFP documents to meet the needs of this project. Michael has utilized and refined these documents for prior projects and will customize the terms to meet the needs of this project.

7. **Public Body (your organization) Construction History:**
Provide a matrix summary of your organization's construction activity for the past six years outlining project data in content and format per the attached sample provided: *(See Attachment E. The applicant shall use the abbreviations as identified in the example in the attachment.)*

- Project Number, Name, and Description
- Contracting method used
- Planned start and finish dates
- Actual start and finish dates
- Planned and actual budget amounts
- Reasons for budget or schedule overruns

See Appendix C for City of Kennewick Public Works Construction History matrix.

8. **Preliminary Concepts, sketches or plans depicting the project**
To assist the PRC with understanding your proposed project, please provide a combination of up to six concepts, drawings, sketches, diagrams, or plan/section documents which best depict your project. In electronic submissions these documents must be provided in a PDF or JPEG format for easy distribution. Some examples are included in attachments E1 thru E6. At a minimum, please try to include the following:

- A overview site plan *(indicating existing structure and new structures)*
- Plan or section views which show existing vs. renovation plans particularly for areas that will remain occupied during construction.
- *Note: applicant may utilize photos to further depict project issues during their presentation to the PRC*

See Appendix D for Technical Memorandum which includes conceptual site plan.

9. **Resolution of Audit Findings On Previous Public Works Projects**
If your organization had audit findings on any project identified in your response to Question 7, please specify the project, briefly state those findings, and describe how your organization resolved them.

N/A – the City has no audit findings to report.

10. **Subcontractor Outreach**
Please describe your subcontractor outreach and how the public body will encourage small, women and minority-owned business participation.

Initial outreach will occur through Association of General Contractors (AGC) with language related to small, women, and minority-owned business participation. The City will prepare a brochure for the project with relevant information that describes the project objectives and timelines.

The City will send the Advertisement for RFQ to Office of Minority and Women's Business Enterprises (OMWBE) to be posted and viewed on their website for contracting opportunities to aid in the encouragement of small, woman and minority-owned businesses to participate in the project.

There will be a requirement in the RFQ for proposers to provide a plan for utilizing OMWBE certified businesses for the project. This will be scored as part of the RFQ evaluation. The PDB contract will also require the Design Builder to track and report utilization of OMWBE certified businesses and veteran certified businesses.

CAUTION TO APPLICANTS

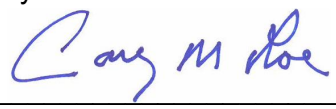
The definition of the project is at the applicant's discretion. The entire project, including all components, must meet the criteria of RCW 39.10.300 to be approved.

SIGNATURE OF AUTHORIZED REPRESENTATIVE

In submitting this application, you, as the authorized representative of your organization, understand that: (1) the PRC may request additional information about your organization, its construction history, and the proposed project; and (2) your organization is required to submit the information requested by the PRC. You agree to submit this information in a timely manner and understand that failure to do so may delay action on your application.

PRC strongly encourages all project team members to read the Design-Build Best Practices Guidelines as developed by CPARB and attend any relevant applicable training. If the PRC approves your request to use the DB contracting procedure, you also understand that: (1) your organization is required to participate in brief, state-sponsored surveys at the beginning and the end of your approved project; and (2) the data collected in these surveys will be used in a study by the state to evaluate the effectiveness of the DB process. You also agree that your organization will complete these surveys within the time required by CPARB.

I have carefully reviewed the information provided and attest that this is a complete, correct and true application.

Signature: 

Name: *(please print)* Cary M. Roe, P.E. *(public body personnel)*

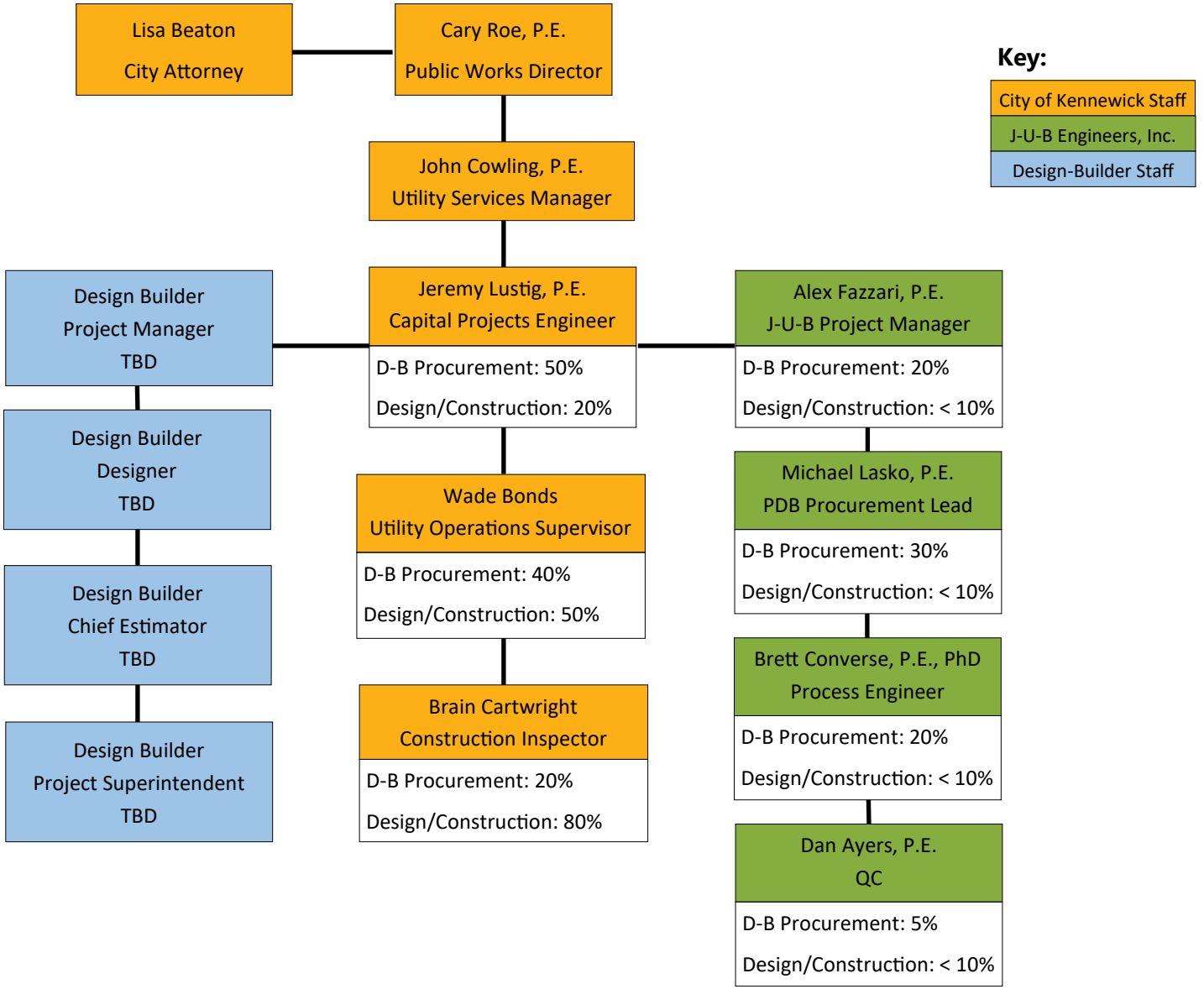
Title: Public Works Director

Date: June 17, 2021

Appendix A

Project Organizational Chart

City of Kennewick WWTP Phase 2 Upgrades
Washington State CPARB PRC Application



Appendix A – Project Organizational Chart

Application Date: June 17 2021.

Appendix B

Key Team Member Experience Matrix

	Key Team Member Experience with Alternative Delivery Projects							
Name	**Experience**	**Organization(s)**	**Relevant Projects (most current in last 10 yrs)**	**Approximate Construction Cost**	**Project Delivery Method**	**Role during project phases**		
						Procurement	**Design**	**Construction**
Jeremy Lustig, P.E.	24 years engineering experience	City of Kennewick (4 yrs) City of Henderson (15 yrs) Las Vegas Valley Water District (3 yrs) PBS&J Consulting (2 yrs)	1. Kennewick, WA 18th & Kellogg Reservoir Replacement 2. Kennewick, WA UPRR 24" Interceptor Sewer Rehab (Phases 1-3) 3. Kennewick, WA Entiat to Canal Transmission Main 4. Henderson, NV P-19A Surge Mitigation Project	1. $15.3 M 2. $3 M 3. $1.7M 4. $1.3 M	1. Design Bid Build 2. Design Bid Build 3. Design Bid Build 4. CMAR	1. Project Manager 2. Project Manager 3. Project Manager	1. Project Manager 2. Project Manager 3. Project Manager 4. Operations Manager	1. Project Manager 2. Project Manager 3. Project Manager 4. Operations Manager
John A. Cowling, P.E.	24 years engineering experience	City of Kennewick (3.5 years) City of Mountlake Terrace (1.5 years) City of Marysville (11 years) City of Sammamish (5 years) Penhallegon Associates Consulting Engineers (3 years)	1. Kennewick WA 18th & Kellogg Reservoir Replacement 2. Kennewick WA WWTP Phase 1 Upgrades 3. Kennewick, WA UPRR 24" Interceptor Sewer Rehab (Phases 1-3) 4. Kennewick, WA Entiat to Canal Transmission Main 5. Marysville, WA Lakewood Overcrossing	1. $15.3 M 2. $2 M 3. $3 M 4. $1.3 M 5. $8.0 M	1. Design Bid Build 2. Design Bid Build 3. Design Bid Build 4. Design Bid Build 5. Design Bid Build	1. Division Manager 2. Division Manager 3. Division Manager 4. Division Manager 5. Division Manager	1. Division Manager 2. Division Manager 3. Division Manager 4. Division Manager 5. Division Manager	1. Division Manager 2. Division Manager 3. Division Manager 4. Division Manager 5. Division Manager

Wastewater Treatment Plant Phase 2 Upgrades – Washington State CPARB PRC Application

Key Team Member Experience with Alternative Delivery Projects								
Name	**Experience**	**Organization(s)**	**Relevant Projects (most current in last 10 yrs)**	**Approximate Construction Cost**	**Project Delivery Method**	**Role during project phases**		
						Procurement	**Design**	**Construction**
Alex Fazzari, P.E.	20 years consulting engineering experience including dozens of projects for the City of Kennewick	J-U-B (5 yrs)	1. Kennewick, WA WWTP Facility Plan 2. Kennewick, WA WWTP Phase 1 Upgrades 3. College Place, WA WWTP Phase 1 Upgrades 4. Walla Walla, WA WWTP UV Upgrades 5. West Richland, WA WWTP Solids Handling Upgrades	1. N/A 2. $2M 3. $20M 4. $3M 5. $2M	1. N/A 2. Design Bid Build 3. Design Bid Build 4. Design Bid Build 5. Design Bid Build	2. Developed Documents for Pre-Procurement of UV Equipment 3. Developed Documents for Pre-Procurement of UV Equipment 4. Developed Documents for Pre-Procurement of UV Equipment	1. Project Manager 2. Project Manager 3. Project Manager 4. Project Manager 5. Project Manager	1. Project Manager 2. Project Manager 3. Project Manager 4. Project Manager 5. Project Manager
Michael Lasko, P.E.	32 years consulting engineering experience providing Owner's Representative Services and Design Manager for Alternative Delivery Projects	Others (5 yrs) Parsons Brinkerhoff (2 yrs) CH2M (20 yrs) J-U-B (5 yrs)	1. Spanish Fork, UT WRF Plant Upgrade 2. Post Falls, ID WTP Outfall and Reuse Line 3. WSDOT US 12 Phase 7/8 Highway Improvement 4. UDOT I-15 Southbound Highway Improvement 5. UDOT Timpanogos Highway Improvement	1. $90M 2. $3.5M 3. $130M 4. $165M 5. $160M	1. CMGC 2. CMGC 3. Design Build 4. Design Build 5. Design Build	1. Owner's Rep – Developed Procurement Documents and Integrated CMGC Partner 2. Owner's Rep – Developed Procurement Documents and Integrated CMGC Partner	3. Project Sponsor/Quality Manager – Design Team 4. Design Manager 5. Design Manager	4. Post design phase services Manager 5. Post design phase services Manager

Wastewater Treatment Plant Phase 2 Upgrades – Washington State CPARB PRC Application

	Key Team Member Experience with Alternative Delivery Projects							
Name	**Experience**	**Organization(s)**	**Relevant Projects (most current in last 10 yrs)**	**Approximate Construction Cost**	**Project Delivery Method**	**Role during project phases**		
						Procurement	**Design**	**Construction**
Levi Shoolroy, P.E.	21 years' experience planning, traditional and alternative design and construction of Wastewater Treatment Facilities	J-U-B (21 yrs)	1. Spanish Fork, UT WRF Plant Upgrade	1. $90M	1. CMGC	1. Owner's Rep – Developed Procurement Documents and Integrated CMGC Partner	1. Design Task Leader	
Gary Vance, P.E.	18 years' experience planning, traditional and alternative design and construction of Wastewater Treatment Facilities	WASTEMINCO (1 yr) US Peace Corps (3 yrs) J-U-B (14 yrs)	1. Spanish Fork, UT WRF Plant Upgrade	1. $90M	1. CMGC	1. Owner's Rep – Developed Procurement Documents and Integrated CMGC Partner	1. Project Manager	
Jim Goodley, P.E.	22 years' experience planning, traditional and alternative design and construction of Wastewater Treatment Facilities	TMH Enviro Services (1 yr) American Water Services (2 yrs) BioChem Technology (6 yrs) Scott Stevens McCoy (2 yrs) J-U-B (11 yrs)	1. Spanish Fork, UT WRF Plant Upgrade	1. $90M	1. CMGC	1. Owner's Rep – Developed Procurement Documents and Integrated CMGC Partner	1. Design Task Leader	
Brett Converse, P.E., PhD	22 years' experience planning, traditional design and construction of Wastewater Treatment Facilities	City of LA (6yrs) UC Davis (6 yrs) J-U-B (17 yrs)	1. Multiple traditional design bid build projects		1. Multiple traditional design bid build projects		1. Project Manager	

Wastewater Treatment Plant Phase 2 Upgrades – Washington State CPARB PRC Application

Key Team Member Experience with Alternative Delivery Projects								
Name	**Experience**	**Organization(s)**	**Relevant Projects (most current in last 10 yrs)**	**Approximate Construction Cost**	**Project Delivery Method**	**Role during project phases**		
						Procurement	**Design**	**Construction**
Dan Ayers, P.E.	34 years' experience planning, traditional design and construction of Wastewater Treatment Facilities	Previous firms (26 yrs) J-U-B (8 yrs)	1. Spanish Fork, UT WRF Plant Upgrade 2. Logan City Composting Facility	1. $90M 2. $5M	1. CMGC 2. CMGC	1. Owner's Rep – Developed Procurement Documents and Integrated CMGC Partner 2. Integrated CMGC Partner	1. Process Mechanical, Hydraulics and QC Task Leader 2. Process Mechanical Design Engineer	
Jon Baune, P.E.	16 years' experience planning, traditional design and alternative delivery and construction of Wastewater Treatment Facilities	J-U-B (16 yrs)	1. Post Falls, ID WTP Outfall and Reuse Line	1. $3.5M	1. CMGC	1. Owner's Rep – Developed Procurement Documents and Integrated CMGC Partner	1. Project Manager	
Christopher Horgan, P.E.	16 years' experience planning, traditional design and alternative delivery and construction of Wastewater Treatment Facilities	J-U-B (12 yrs)	1. Post Falls, ID WTP Outfall and Reuse Line	1. $3.5M	1. CMGC	1. Owner's Rep – Developed Procurement Documents and Integrated CMGC Partner	1. Design Task Lead	1. Construction Manager

Appendix C

Construction History

Project Name	Project Description	Contracting Method	Notice to Proceed	Working Dates Proposed	Actual Working Days	Planned Budget Amount	Actual Budget Amount	Reason for Budget and Schedule Overruns	Project Status
18th & Kellogg Reservoir Improvements (P1810)	Construction of 6 mil gal water reservoir and booster pump station to replace the existing 10 mill gal.	DBB	3/23/2020	571	TBD	$16,135,130	TBD	Project is still in progress	In Progress
Washington St. Corridor Improvement (P1918)	This project is for the narrowing of a portion of N. Washington Street from Kennewick Avenue to Canal Drive, adding landscape planters, replacing and widening sidewalks from Kennewick Avenue to Columbia Drive. Work includes, but is not necessarily limited to, installation of pedestrian ramps, sidewalks, irrigation, street and pedestrian lighting, striping improvements, and other related work.	DBB	4/19/2021	60	TBD	$849,400	TBD	Substantial Completion ETA 7/14/2021	In Progress
2021 Bituminous Surface Treatment Seal Coat (P2021)	This project includes the application of bituminous surface treatment (BST) seal coat of paved arterial streets within the Kennewick City limits. All work and materials shall be in accordance with WSDOT Standard Specifications Section 5-02, except as modified, or supplemented by these Special provisions. Work includes, but is not necessarily limited to pavement patching of select areas for BST streets, pre-project sweeping by City crews, traffic control, covering and uncovering of utilities, removal of plastic pavement markings, supply, placement and removal of temporary flexible raised pavement markers, fog seal of pavement patches, BST (Seal Coat) including supply, haul and spreading of 3/8” to #10 crushed aggregate and emulsified asphalt, post project sweeping, sweeping sidewalks as required to remove any debris that results from the project, haul and disposal of picked up excess rock to a contractor provided waste site, application of fog seal, paint striping, and preformed thermoplastic pavement markings.	DBB	6/21/2021	Not to exceed 7/23/2021	TBD	$550,000	TBD	Substantial Completion not to exceed 7/23/2021	In Progress
2021 City-Wide Asphalt Overlay (P2101)	Work will involve planing (grinding) as called for on the plans. HMA overlay, patching of miscellaneous failed areas, concrete sidewalk ramp upgrades, pavement lane striping, cross walks, stop bars, and markings and other related work, all in accordance with the Contract Plans, Contract Provisions, and the Standard Specifications.	DBB	Waiting Fully Executed Contracts & Bonds	70	TBD	$1,300,000	TBD	-	In Progress
Biosolids Removal Lagoon #1 2021 (P2109)	The project consists of removal, dewatering, weighing, hauling and land applying of biosolids from Aerated Lagoon No. 1 located at the City of Kennewick (City) Wastewater Treatment Plant in accordance with the Special Provisions and the Technical Specifications.	DBB	Waiting Fully Executed Contracts & bonds	160		$2,495,000	TBD	-	In Progress

W. 10th Ave Widening (P1714)	This contract is for the improvement to widen the south side of 10th Avenue to complete a 3-lane road, with bike lanes, curb, gutter, sidewalk, storm drainage, illumination and HMA Overlay. The existing roadway width is approximately 23-feet and the existing right of way is 80-feet wide. The improvement on W. 10th Ave involves widening the street to a width of 44-feet between curbs to include a two-way left turn lane. This is the same street section that was previously improved east of the roundabout at S. Steptoe St. and W. 10th Ave. The project will include curb, gutter, separated sidewalks, storm drainage manholes, storm drainage catch basins, street lights, sewer manholes and pipe, irrigation and landscaping.	DBB	2/18/2020	120	195	$1,999,929	$1,711,393	-	Complete
UPRR 24" Sewer Rehabilitation Phase 3 (P1930)	This project is for the construction of the UPRR 24-Inch Interceptor Sewer Rehabilitation Phase 3 Project and consists of rehabilitating the UPRR 24-Inch Interceptor Sewer. The rehabilitation effort includes approximately 3,173 linear feet using trenchless rehabilitation techniques (CIPP thermally cured or UV cured). The project also includes approximately 3,600 linear feet of temporary sewer by-pass pumping.	DBB	8/24/2020	45	43	$627,000	$678,071	-	Complete
2020 City-Wide Asphalt Overlay (P2001)	Work will involve planing (grinding) as called for on the plans, HMA overlay, minor traffic signal work, concrete sidewalk ramp upgrades, pavement lane striping and markings and other related work, all in accordance with the attached Contract Plans, these Contract Provisions, and the Standard Specifications.	DBB	6/22/2020	110	115	$1,793,000	$1,597,220	6 days added for additional work/ Change Order #1	Complete
24" Sanitary Sewer UPRR Phase 1 & 2 (P1604)	This project is for the construction of the UPRR 24-inch Interceptor Sewer Rehabilitation project parallel to the Union Pacific Railroad. The project consists of rehabilitation of 2,232 lineal feet of 24-inch diameter RCP sewer utilizing trenchless technology, cured-in-place pipe (CIPP). The project also includes either; full replacement (using standard open cut) or CIPP of 963 lineal feet of 24-inch diameter RCP sewer. All manholes will require a sprayed protective lining to reduce hydrogen sulfide induced corrosion.	DBB	Phase 1: 1/14/2019 Phase 2: 9/03/2019	Ph 1: 80 Ph 2:		$2,113,000	$1,004,194	-	Complete
Zone 2 West 7th Ave. Transmission Main (P1912)	This Capital Improvement Project involves the installation of a 30-inch diameter ductile iron transmission main pipe from W. 10th Ave and S. Edison St. intersection along Edison St. to W. 7th Ave, then along W. 7th Ave to a private access road and utility easement, then along the private access road to W. 4th Ave. The Project also includes the installation of a 16-inch diameter ductile iron transmission main pipe from W. 10th Ave and S. Edison St. intersection along W. 10th Ave. to S. Dawes St.	DBB	2/21/2020	160	169	$3,516,214	$3,436,613	CO #1 add 5 days; CO #2 add 2 days; CO #3 add 8 days; CO #4 add 1 day	Complete

Entiat to Canal Waterline (P1606)	This contract is for the improvement of a section of Clearwater Avenue near the intersection of Columbia Center Boulevard., improvements at the intersection of North Union Street and West Clearwater Avenue, and improvements of Clearwater Avenue between the intersections of North Huntington Street and State Route US 395. The project includes street improvements, mountable curbs (c-curbs), tapers, signal modifications, channelization modifications, driveway modifications, and other miscellaneous improvements.	DBB	1/16/2019	120	198	$1,779,155	$1,741,116	-	Complete
W. 14th Place Outfall & Misc. Storm Sites (P1931)	This project includes, but is not limited to, construction of the following: Installation, repair and abandonment of storm drywells, connecting to existing storm lines, installing approximately 230 lineal feet of 10 and 12-inch diameter storm line, installing approximately 486 lineal feet of 18- inch diameter storm line, installing approximately 120 lineal feet of 12- inch diameter slotted drain pipe within City of Kennewick right-of-way as identified in the Specifications, Contract Plans, and Contract documents.	DBB	1/20/2020	60	80	$561,500	$348,758	Change Orders issued allowed extra working days.	Complete
Metaline Avenue Widening (P1309)	This contract is for the reconstruction of W. Metaline Avenue from N. Kellogg Street to N. Edison Street. Improvements include adding curb, gutter and sidewalk, reconstructing the asphalt roadway, re-striping, adjusting of new utilities, installing new water and sewer line, utility work, storm system construction, street lighting, signage, pedestrian ramps, traffic control, and other work as required.	DBB	6/11/20218	110	128	$2,282,431	$2,030,245	Project was suspended due to weather conditions. Change Orders issued allowed extra working days.	Complete
Kennewick Avenue Pavement Preservation (P1823)	This contract is for the improvement of 1.56 miles of Kennewick Avenue from SR 395 to N. Fruitland Street. Work will involve lowering of existing utilities, planing (grinding) as called for on the plans, patching of miscellaneous failed areas, overlaying (utilizing a Material Transfer Device or Material Transfer Vehicle), pavement lane striping, cross walks, stop bars, signage, remove/replacing and painting existing “C” curb, traffic control, pavement markings, remove/replacing of curb ramps and upgrading street lights to LEDs.	DBB	7/23/2019	60	58	$1,874,795	$1,596,803	-	Complete
Street Waste Facility Design & Expansion (P1607)	This project consists of the construction of a street waste facility. Work includes, but is not necessarily limited to, installation of storm drainage, water and sewer lines, street sweeper and vactor stations, clarifier, waste storage facilities, asphalt concrete pavement, irrigation, landscaping, and other related work.	DBB	1/28/2019	Not to exceed 5/31/2019	6/20/2019	$933,380	$865,557	Change Orders issued allowed extra working days.	Complete

UGA Stormwater Facility (P1817)	This project consists of the construction of stormwater ponds and stormwater conveyance piping. Work includes, but is not necessarily limited to, installation of storm drainage lines and manholes, pond excavation, landscaping, asphalt paving and other related work.	DBB	3/29/2019	65	54	$436,100	$395,348	-	Complete
2019 City-Wide Asphalt Restoration (P1911)	This project is for the HMA improvements of the following streets: S. Kellogg Street (W. 10th Ave. to the KID Canal Crossing), S. Union Street (W. Clearwater Ave. to W. 10th Ave.), and W. 10th Ave. (S. Quincy Place to S. Garfield St.). There will also be resurfacing on the West Canal Drive bridge deck at N. Carmichael Drive. Work will involve lowering of existing utilities, planing (grinding) as called for on the plans, HMA overlay, minor waterline installation, concrete sidewalk ramp upgrades, pavement lane striping and markings and other related work.	DBB	6/17/2019	65	65	$1,604,500	$1,557,282	-	Complete
2019 Bituminous Surface Treatment Seal Coat (P1914)	This project includes the application of bituminous surface treatment (BST) seal coat of approximately 12.67 miles of paved arterial streets within the Kennewick City limits. Work includes, but is not necessarily limited to pavement patching of select areas for BST streets, pre-project sweeping by City crews, traffic control, covering and uncovering of utilities, removal of plastic pavement markings, supply, placement and removal of temporary flexible raised pavement markers, fog seal of pavement patches, BST (Seal Coat) including supply, haul and spreading of 3/8” to #10 crushed aggregate and emulsified asphalt, post project sweeping, sweeping sidewalks as required to remove any debris that results from the project, haul and disposal of picked up excess rock to a contractor provided waste site, application of fog seal, paint striping, and preformed thermoplastic pavement markings.	DBB	6/24/2019	Complete by 7/26/2019	NA	$625,900	$573,248	-	Complete
Wastewater Treatment Plant Upgrades Ph I (P1512)	First Phase of the WWTP Plant upgrades, included upgrades to UV disinfection, final clarifiers, lagoon lift station, emergency generator and energy efficiencies.	DBB	6/26/2017	200	?	$3,684,932	$2,018,647	-	Complete
Vista Field Improvements Phase I (P1707)	This project is for the replacement of an existing 8” A.C. waterline on both N. Colorado Street and N. Young Street with a new 12" D.I. waterline in anticipation of the Vista Field Development. A new PRV vault will also be included with this work. Both N. Colorado Street and N. Young Street will receive an asphalt overlay.	DBB	9/10/2018	80	175	$1,700,000	$1,652,084	Change Orders issued allowed extra working days.	Complete

2018 City-Wide Pavement Preservation (P1801)	This project is for the improvement of a portion of the following streets: Columbia Center Blvd. (W. Quinault Ave. to SR240 ROW), S. Washington Street (E. 10th Ave. to E. 19th Ave.), and S. Quillan Street (W. 27th Ave. to W. 28th Ave.). There will also be work on portions of Keywaydin Drive and the parking lot of Fire Station #4 located at 2620 W. 27th Ave.. Work will involve lowering of existing utilities, planing (grinding) as called for on the plans, patching of miscellaneous failed areas, minor sewer line replacement, overlaying, pavement lane striping, cross walks, stop bars, signage, traffic control, pavement markings and other work.	DBB	7/18/2018	60	85	$1,328,065	$1,304,934.56	Change Orders issued allowed extra working days.	Complete
Juniper & Hawthorne Half Street - HUD (P1804)	This project includes, but is not limited to, construction of the following: Approximately 380 lineal feet of 8-inch PVC gravity sewer main, from W . Okanogan Ave. and N. Fillmore St. to the north end of Fillmore {dead end) and from W. Okanogan Ave and N. Edison Pl. to the south end of Edison (cul-de-sac), and two standard 48-inch concrete manholes. Additionally there is approximately 1,300 lineal feet of 8-inch water line installation, abandonment of the existing water line and a 1-inch HMA overlay. Work includes, but is not necessarily limited to, installation of water lines, water services, fire hydrants, sewer lines, sewer manholes and sewer service lines, trench restoration and other miscellaneous work as called for on the construction plans and these special provisions. Restoration work will consist of repairing gravel shoulders and landscaping.	DBB	7/9/2018	45	49	$412,608	$380,890	Change Orders allowed 7 extra working days.	Complete
Fillmore and Okanogan Water/Sewer (P1814)	his contract is for the improvement of a section of Clearwater Avenue near the intersection of Columbia Center Boulevard, improvements at the intersection of North Union Street and West Clearwater Avenue, and improvements of Clearwater Avenue between the intersections of North Huntington Street and State Route US 395. The project includes street improvements, mountable curbs (c-curbs), tapers, signal modifications, channelization modifications, driveway modifications, and other miscellaneous improvements.	DBB	7/18/2018	55	51	$441,750	$411,133	-	Complete
Clearwater Avenue – Leslie Rd. to US 395 (P1214)	This contract is for the improvement of a section of Clearwater Avenue near the intersection of Columbia Center Boulevard, improvements at the intersection of North Union Street and West Clearwater Avenue, and improvements of Clearwater Avenue between the intersections of North Huntington Street and State Route US 395. The project includes street improvements, mountable curbs (c-curbs), tapers, signal modifications, channelization modifications, driveway modifications, and other miscellaneous improvements.	DBB	4/10/2017	100	126	$1,170,889	1,100,338	Change Orders allowed 24 extra working days.	Complete

Bob Olson Parkway & Hildebrand Boulevard (P1601)	This project is for the construction of a 5 lane arterial roadway and widening of an existing roadway. The project includes roadway excavation and embankment, regrading and compaction of a previously prepared roadway subgrade and ditches, water line, sewer pipe, storm drain pipe, finish grading, crushed surfacing, curb and gutter, sidewalk, asphalt paving, and other items.	DBB	8/10/2016	180	219	$7,079,368	$6,871,692	Change Orders approved extra working days	Complete
2017 City-Wide Asphalt Restoration (P1704)	City-wide asphalt patching project to repair numerous isolated areas of failed pavement.	DBB	7/10/2017	65	65	$1,629,374	$1,617,240	-	Complete
2017 Water/ Sewer CIP (P1705)	This project will install new water mains along W. Kennewick Avenue between N. Union St. and N. Morain Pl. and also along N. Conway St. between Vista Way and W. Bruneau Pl. Additionally, new sewer mains will be installed on E. 14th Ave. east of S. Washington St., also along S. Washington St. between E. 14th Ave. and E. 13th Ave and along S. Union St. between W. 15th Ave. and W. 19th Ave.	DBB	8/21/2017	65	68	$935,825	$862,680	Extra days approved	Complete
2017 Pavement Preservation (P1712)	City-wide milling and asphalt overlay of Union St., Columbia Drive and W. 27th Ave.	DBB	2/20/2018	80	87	$1,811,630	$1,840,015	Extra days approved	Complete
2017 Water / Sewer CIP Phase 2 (P1715)	The 2017 Water / Sewer CIP – Phase 2 project consists of the installation and improvements of water mains and sewer mains within City of Kennewick right of way. The project involves the replacement of water service lines, water meters, relocating a meter, as required to replace substandard and undersized existing water system as identified. The project will improve a deteriorating sewer system main, remedy sewer flow issues and replace a sewer cleanout with a sewer manhole as identified.	DBB	2/5/2018	80	125	$761,719	$682,193	Approved extra working days	Complete
Columbia Drive Streetscape (P1503)	This project is for the construction of a bus pullout, curb and gutter, sidewalk, landscaping, and decorative street lighting along Columbia Drive.	DBB	9/20/2016	65	116	$479,000	$328,529	Extra days approved due to weather conditions	Complete
2017 Emergency Biosolids Removal (P1710)	Emergency project to dredge one of the Wastewater Treatment Plant lagoons that had filled with biosolids at a quicker rate than anticipated. Project was completed to ensure discharge permitting compliance was not compromised as well as to address significant odor issues.	DBB	4/17/2017	No Proposed Working Days	97	$2,369,861	$2,341,088	Emergency Project	Complete

Steptoe Phase 3 / Hildebrand Blvd. (P1208)	The Steptoe Street Extension and Hildebrand Blvd. Extension, Phase 3A project provides for the improvement of Steptoe Street, formerly Cloldfelter, from 4th Avenue to a temporary connection with 10th Avenue south of Amon wasteway to a four lane roadwa~ with center left turn provisions and includes a new roundabout at the intersection with 10 Avenue north of Amon Wasteway and the improvement of 10th Avenue to Montana street. This project includes but is not necessarily limited to, roadway excavation and embankment construction, crushed surfacing, storm drainage, sanitary sewer and water facilities, curb and gutter, sidewalks, gravity block retaining walls, HMA paving, illumination, signage and pavement markings, and other related work. The Steptoe Street Extension and Hildebrand Blvd. Extension, Phase 3B Interim project provides for the completion of a majority of the street subgrade for both the extension of Hildebrand Blvd. and the future re-connection of Clodfelter at a new roundabout, and storm drainage and sanitary sewer facility installations from the end of Phase 3A to a connection with Sherman Road.	DBB	8/18/2014	360	420	$11,259,901	$6,614,158	Change Orders approved extra working day	Complete
Zone 5 Reservoir Transmission Main (P1335)	This project is for the construction of approximately 2,877 lineal feet of 18-inch diameter ductile iron water main from the future intersection of Sherman Street and W. 30th Avenue to the City's Thompson Hill Reservoir. The project includes excavation and embankment for a future street, construction of a gravel access road, and other miscellaneous work.	DBB	3/6/2017	45	41	$454,475	$318,335	-	Complete
Southridge Blvd. Reconstruction (P1515)	This project is for the reconstruction of Southridge Boulevard, north from Christensen Road for approximately 2100' to tie into the existing curbs south of the Southridge Boulevard and Ridgeline Drive roundabout. The project includes water, sewer, storm drainage, curb and gutter, sidewalk, streetlights and other miscellaneous improvements.	DBB	1/9/2017	100	117	$1,347,210	$1,105,698	Approved extra working days	Complete
SR397 & E. Columbia Dr. Waterline (P1610)	This project consists of the installation of water mains within the City of Kennewick and Washington State Department of Transportation (WSDOT) right of way. Work includes the installation of 8-inch and 12-inch diameter water mains, replacement of existing water service lines and fire hydrants, boring and jacking a 24-inch diameter steel casing, asphalt and gravel restoration, and other miscellaneous items.	DBB	2/6/2017	45	154	$450,600	$480,018	Change Order for extra work	Complete

Hildebrand & Ridgeline Looping (P1706)	This project includes, but is not limited to, construction of the following: Approximately 2,206 lineal feet of 12-inch diameter ductile iron water main from an existing 12-inch stub, south of the intersection of South Sherman Street and West 33ro Place, to an existing 12-inch stub, east of the intersection of Ridgeline Drive and S. Nelson Street including installation of valves and fittings in an existing roadway right-of-way. Asphalt patching and gravel shoulder restoration work will consist of the removal and disposal of the existing asphalt, top course surface preparation, paving with new asphalt, placing and compacting 5/8-inch minus rock.	DBB	6/3/2019	40	28	$478,400	$329,108	-	Complete
Edison Street Widening (P1101)	This contract is for the improvement of approximately 0.43 miles of North Edison Street from West Clearwater Avenue to West Hood Avenue and from West Okanogan Ave/Place to West Canal Drive. The roadway will be widened typically from 48 feet to 66 feet. Work includes streetlights, traffic signals, catch basins, fire hydrants, water meters, installation of a pedestrian crossing, striping, signing, rectangular rapid flash beacons, and the removal and installation of curb, gutter and sidewalks. The project will include grinding and HMA paving. Trench excavation will be required to install conduits provided by utilities. Existing landscaping will be restored to new back of sidewalk. This project includes items of work that are required to be completed at night to minimize traffic impacts.	DBB	2/1/2016	140	164	$2,490,325	$2,221,427	Change Orders allowed for extra days	Complete
Elliott Lake Water System (P1508)	This project is for the installation of water mains and related construction, new water services, new fire hydrants, replacement of substandard meters and meter boxes, trench pavement restoration, 1-inch overlay and other miscellaneous work as called for on the construction plans and these special provisions.	DBB	8/8/2016	75	66	$995,210	$859,404	-	Complete
W. 7th Avenue Extension (P1518)	This project involves extending W. 7th Place east for app. 540'. Project includes water, sewer, storm, irrigation, curb, gutter and sidewalk. Streetlights and HMA paving are also included.	DBB	6/29/2016	60	60	$585,275	$414,140	-	Complete
Columbia Center Blvd. Pavement Preservation (P1403)	This contract is for the improvement if 4,900 linear feet of Columbia Center Boulevard, from West Clearwater Avenue to West Quinault Avenue. Work will involve lowering of existing utilities, planing (grinding) as called for on the plans, patching of miscellaneous failed areas, overlaying, pavement lane striping, crosswalks, stop bars, signage, removing/replacing and painting existing 'C' curb and island curbs, traffic control, pavement markings, and other miscellaneous work. Most work is designated as night work.	DBB	8/3/2015	30	27	$1,060,000	$730,987	-	Complete
Grandridge & Young Intersection Improvements (P1304)	Construction of a roundabout at the intersection of Grandridge and Young St. Includes landscaping and underground utility reconstruction.	DBB	7/14/2014	50	55	$632,360	$574,294	Change Orders issued allowed extra working days	Complete

Dayton Street CID Canal Bridge (P0903)	This project will involve removing of the existing bridge that spans the Dayton St. canal. The existing piers will remain, new piers will be constructed behind the existing ones. Concrete approaches will be constructed on each side of the bridge. The road will be regarded to match the new structure. New curb gutter and sidewalk will be installed. No utilities will be affected. A portion of the KSD parking lot driveway will be reconstructed and regraded.	DBB	6/17/2014	50	58	$645,000	$611,353	Change Orders issued allowed extra working days	Complete
Beech St. Sewer Interceptor Ph. 2 (P1305)	Replacement of a sewer transmission main with a larger diameter main as identified in the City's sewer system plan to address capacity issues and future growth.	DBB	5/5/2014	100	142	$1,872,014	$2,002,859	Change Orders issued allowed extra working days	Complete

Appendix D

Technical Memorandum

MEMORANDUM

DATE: 7-9-2020

TO: John Cowling, City of Kennewick

CC:

FROM: J-U-B Engineers, Brett Converse, P.E., Ph.D., and Alex Fazzari, P.E.

SUBJECT: Alt. 5 Manage Un-Stabilized Biosolids with Florida Green Cost Comparison

Introduction

In 2013, The City of Kennewick (CLIENT) selected J-U-B to complete a Facility Plan for the Wastewater Treatment Plant (WWTP). The Facility Plan was dated June 2015 and approved by Washington Department of Ecology on August 5, 2015. The Facility Plan identified 4 phases of improvements over the planning period:

Phase 1 – General
- Replace UV disinfection system
- Emergency bypass improvements
- Influent pump station improvements
- Sludge lagoon effluent lift station addition

Phase 2 – Improvements to the biosolids management process to produce Class B biosolids
- Waste activated sludge thickening
- Anaerobic digester
- Dewatering biosolids and haul to a land application site for beneficial reuse

Phase 3 – Biological treatment upgrades
- Concrete activated sludge basins with fine bubble aeration (diffused air)
- Grit removal unit process

Phase 4 – Additional biosolids management improvements to produce Class A biosolids
- Construct Solar dryers to produce Class A Biosolids
- Beneficially reuse biosolids locally by:
  - Selling to landscapers
  - Using on City Parks
  - Selling or giving to public
  - Other? Class A biosolids are a nutrient rich soil amendment and are easier to beneficially reuse than Class B biosolids.

Phase 1 has been completed. Phase 2 is in the planning process. Since the completion of the Facility Plan, the City has identified a new biosolids management process (by Merrell Brothers) that would meet Phase 2 and Phase 4 goals (Alternative 5). The City and JUB have been working with Merrell Bros, Inc. to

evaluate this alternative concept for solids handling at the WWTP which involves thickening waste activated sludge, mechanical aeration/stabilization/air-drying inside of a greenhouse, and then heat drying and pasteurization to produce Class A biosolids. Merrell Brothers has sized a conceptual facility for Kennewick and developed cost opinions to match the Facility Plan year 2034 design criteria of 3,650 dry tons per year, thereby allowing the previously considered solids stream management alternatives to be compared with this alternative.

This technical memorandum reviews the cost opinion provided by Merrell Brothers and compares the Merrell Brother's cost to the alternative selected in the 2015 Facility Plan. J-U-B developed a preliminary site layout of the proposed facility based on information provided by Merrell Brothers but did not confirm any sizing. Phase 3 improvements were not re-evaluated at this time; however, the design criteria for Phase 3 should be checked to ensure they are adequate to work with Alternative 4 or 5 (depending on which is selected) when Phase 3 is designed.

The Facility Plan estimated the Phase 2 and Phase 4 biosolids management improvement costs to be approximately $41.7 and $15.7 million respectively in Year 2014 Dollars, Net Present Value (NPV); reference Table 7-14 and Table 7-18. (Note: the Cost of $41.8M reported in Table 7-16 is an incorrect rounding error and should be $41.7).

For this evaluation, the City suggested using $60/hr for the burdened labor rate rather than $110/hr used in the Facility Plan. Therefore, adjusting for the reduced labor rate, the Phase 2 and Phase 4 costs are $40.43 and $13.98 million, respectively, for a total NPV cost of $54.41 million (Year 2014 Dollars). Using ENR's construction cost index between 2014 and 2020 of 1.155 the estimated 2020 cost is $62.84 million. Because Phase 2 included anaerobic digestion and stabilization of biosolids, the Phase 4 project did not include odor control, other than building ventilation.

Alternative 5 – Florida Green

Merrell Brothers is proposing a biosolids management alternative that would remove the solids storage lagoons from service and add a mechanical dewatering step for the daily processing of biologically activated sludge wasted from the treatment plant every day. Dewatered waste activated sludge (WAS) will result in un-classified biosolids that will be further conditioned to Class A standards to allow beneficial use. Beneficial use is required by Washington rules. Merrell Brothers is proposing to use Florida Green (trademark), a technology developed by Merrell Brothers to condition the unclassified biosolids to Class A standards.

Merrell Brothers developed the Florida Green (FG) technology and constructed a facility in Pasco County Florida that receives dewatered biosolids from the County's wastewater treatment plants and further conditions them to meet Class A standards. The facility has been in operation since 2017 and produces approximately 6,000 tons of Class AA biosolids per year. City staff became aware of this facility and toured the operation in January of 2019. Photos of the Pasco County Facility are in **Appendix A**.

Un-classified biosolids can be treated to meet Class A requirements in a number of ways under Title 40 CFR 503 regulations. Those options were reviewed during the Facility Planning Process in a workshop with the City and a short-list of feasible options was developed. Those options are:

- Drying the biosolids to less than 10% moisture content. This can be done by:

    - Solar energy and fans to evaporate the water and move it away from the biosolids, or by
    - Adding external heat to evaporate the water, or a
    - Combination of solar energy and heat
- Chemical treatment to increase the pH and temperature for a specific length of time.
- Aerobically composting classified or un-classified biosolids with a bulking agent to achieve time and temperature requirements.

The Florida Green system uses a combination of the following technologies to meet Class A biosolids requirements:

- Solar energy to dry biosolids in greenhouses to a solids content between 55 and 60 percent, then
- Heat via a thermal drying unit to take the solids content to greater than 90%, then
- Pathogen destruction via pasteurization via second stage thermal heating unit to provide time and temperature requirements (30 minutes at 70 degrees C).

There is only one Florida Green Facility in operation and the methodology does not have industry-standard design criteria; therefore, in 2019 the City and Merrell Brothers pilot tested the Florida Green process by constructing a small greenhouse to dry biosolids from the City of Kennewick's WWTP under summer and winter conditions in Kennewick. The solar dried biosolids were transported to the Florida Green facility in Florida for heat treatment to Class A standards. Merrell Brothers used the pilot testing experience to size facilities specific to the climate in Kennewick.

Meeting Class A requirements should provide the City with more flexibility over disposal options because they will not be subject to the variations in price and availability of licensed beneficial use facilities and availability of land for Class B land application. Additionally, producing Class A biosolids offers the City an opportunity to beneficially use biosolids on City owned facilities such as parks and ball fields. The City should evaluate disposal options to confirm a default plan for disposing of the Class A biosolids generated on an annual basis.

Merrell Brothers has proposed a process layout and operation plan for Kennewick based on the application of this technology in Pasco County Florida with improvements based on their experience. The Florida Green Process Layout proposed by Merrell Brothers is shown in **Appendix B3**. That layout has been superimposed on an aerial image for context with the WWTP facility in **Appendix C**. Merrell Brothers has provided a custom-designed approach to processing biosolids but did not provide all unit process design criteria, sizing parameters, operating conditions, etc. Further, J-U-B cannot apply typical literature values to confirm the recommendations in MB's proposal given the unique characteristics and features of their biosolids processing system. If this alternative is carried forward for a traditional design-bid-build project, additional effort will be required to establish definitive design criteria for process components. Alternatively, the City may choose to undertake an alternative delivery approach, which was the path adopted in Pasco County Florida.

Cost Considerations

A planning level cost estimate to construct and operate a Florida Green Biosolids Management Facility capable of managing the City's estimated solids production through the year 2034 was requested and received from the owner/operator of the Pasco County Facility, Ted Merrell (received May 26th, 2020). See **Appendix B3** for the initial planning level cost estimate.

The initial cost estimate of $16.5 million was reviewed by J-U-B and comparisons were made between the cost estimating methodology used in the Facility Plan and FG's methodology. Effort was made to format the FG cost estimate into the format used in the Facility Plan with the goal of having an "apples to apples" cost estimate so comparisons could be made. J-U-B formatted FG's cost estimate into the Facility Plan cost estimating methodology by adding items typically included in mechanical treatment facility cost estimates (catwalks, piping, bonding, contractor profit, electrical, etc., see the Facility Plan cost estimates for examples). The formatted planning level cost estimate was sent to Mr. Merrell for review. J-U-B and Mr. Merrell discussed the formatted planning level cost estimate, and J-U-B's attempt to create an "apples to apples" comparison, and to ascertain potential differences and discrepancies between the two cost estimating approaches. Upon discussing the cost estimate it became clear that several items J-U-B had as a line item, Mr. Merrell had included in his equipment cost estimates. For example, J-U-B typically has a catwalk cost as a line item and Mr. Merrell included the catwalk in the belt filter press line item.

Mr. Merrell adjusted his cost estimate to more closely align with the Facility Plan methodology and explained his basis of cost and what items were included in his line item estimate. FG's adjusted cost estimate is included in **Appendix B1** (received June 5th, 2020). The adjusted FG cost estimate, including annual operation and maintenance cost based on experience, is reported in **Table 1**.

Table 1 – Florida Green's Cost Estimate, June 5th, 2020

Component	Cost, millions
Dewatering Unit Process Solar Drying Greenhouses Thermal Drying Unit	$17.2 (base cost)
Contingency 20%	$3.4
State Sales Tax	$1.43
Present Value of Annual Cost (20-yr)	$10.2
Total	**$32.2**

J-U-B subsequently made the following six changes to Florida Green's cost estimate (see **Appendix B2** for a detailed cost estimate):

1. RSMeans City Cost Indexes were used to adjust the cost of construction labor between Pasco County and Eastern Washington. The equipment cost quote was based on delivery to Kennewick Washington; therefore, the cost index ratio was not applied to equipment cost. Based on discussions with City staff and Ted Merrell, it was decided that about 50% of Florida Green's base cost estimate ($17.2M) was equipment and 50% was labor. The cost index ratio of 1.155 was applied to 50% of Florida Green's base cost estimate which added $1.33 million to the base cost as shown in the following calculation:
    - ($17.2*0.5)*0.155 = $1.33. (shown in red on line 32 of the cost estimate.)
2. Added $187,000 to extend a natural gas pipe to the site (shown in red on line 34) by extending Cascade Natural Gas from their nearest line location at Chemical Dr. and 3rd Ave. Assumes $24,000 of Line item 15 is for water and sewer and $93,000 is for natural gas for a total cost to extend a natural gas line to the site of $280,000. It should be noted that Cascade Natural Gas may contribute a portion of the cost to extend the natural gas line to support a large industrial natural gas user.
3. Increased the contingency to 30%. While Mr. Merrell's cost estimate was based on very recent construction activity which will reduce unknowns and lower risk, there are still uncertainties associated with private verses public construction. Further, use of a contingency value of 30% is consistent with the Facility Plans cost estimates. City Staff noted that the Florida Green approach is well known and understood by Merrell Brothers and a 30% contingency is conservative.
4. Added 20% back in for design and construction management services (second red circle) and subtracted the Engineering Cost in Mr. Merrell's estimate. The planning level design/CMS cost is typically 20%; however, several of FG's major system components included engineering. To account for Mr. Merrell's engineering cost, his engineering cost estimate (Item 2) was subtracted from the 20% design/CMS cost. Everything else from pipe stands to electrical switches has to be designed per a typical public project with bid documents for a competitive bid.
5. Added 1% back in for City's Legal and Administrative costs (third red circle). This is a City cost regardless of project.
6. Increased the labor cost from $40/hr to $60/hr (fourth red circle) as recommended by City staff.

The estimated cost to produce Class A biosolids from un-stabilized WAS using the Florida Green system is reported in **Table 2**. The detailed cost estimate is in **Appendix B2**.

Table 2 – Florida Green Adjusted Cost Estimate

Component	Cost, millions
Dewatering Unit Process Solar Drying Greenhouses Thermal Drying Unit	$18.61
Contingency 30%	$5.58
State Sales Tax	$1.54
Design/CMS	$3.14
Legal Administrative	$0.19
Present Value of Annual Cost	$13.28
Total	**$42.34**

Alternative 4 and Alternative 5 Cost Comparison

For comparison purposes, the cost of Alternative 4 from the 2015 Facility Plan is shown alongside the Merrell Brothers Florida Green cost in **Table 3**.

Table 3 – Alt 4 and Alt 5 Cost Comparison

Alternative 4				Alternative 5	
	Cost, millions, 2014		Cost, Millions, 2020		Cost, Millions, 2020
Component	Phase 2 [A]	Phase 4 [B]		Component	
Thickening, Digestion, Dewatering	$16.22		$18.74	Dewatering Unit Process Solar Drying Greenhouses Thermal Drying Unit	$18.61
Contingency 30%	$4.87		$5.62	Contingency 30%	$5.58
State Sales Tax	$1.75		$2.02	State Sales Tax	$1.54
Design/CMS	$4.22		$4.87	Design/CMS	$3.14
Legal Administrative	$0.21		$0.24	Legal Administrative	$0.19
Present Value of Annual Operating Cost	$10.1		$11.66	Present Value of Annual Operating Cost	$13.28
PV of Disposal	$ 3.1[C]		$3.54		???
Solar Dryers		$6.17	$7.13		
Contingency 30%		$1.85	$2.14		
State Sales Tax		$0.67	$0.77		
Design/CMS		$1.60	$1.85		
Legal Administrative		$0.08	$0.09		
Present Value of Class A Disposal		$0.46	$0.53		
Present Value of Annual Operating Cost		$3.15	$3.64		
Phase Total		**$13.98**	**$16.15**		
Phase Total	**$40.43**		**$43.69**		
Total	**$54.41**		**$62.84**	**Total**	**$42.34**

[A] Facility Plan Table 7-14, Breakdown, with labor rate at $60/hr
[B] Facility Plan Table 7-18, Breakdown, with labor rate at $60/hr
[C] Present value cost of Class B disposal assuming Phase 4 construction in 2034.

Evaluation Criteria

As part of the 2014 facility planning effort, a workshop was held with City staff to establish the criteria for the evaluation of the base alternatives. The established evaluation criteria and their definitions are documented in **Table 3**.

Table 3 – Evaluation Criteria

Criteria	Definition
A) Present Worth Cost	Planning level capital cost plus expected life-cycle cost of an alternative, both in 2014 dollars. The costs reported are approximate and for comparison purposes only. More refined cost estimates will be developed for the preferred alternatives.
B) Permit Compliance	Ability to satisfy existing and projected permit requirements over the course of the study period.
C) Reliability	Probability of adequate performance over the expected range of loading and operating conditions in the study period. Consideration is also given for number of similar facilities currently in operation.
D) Safety [(a)]	Degree to which operators are exposed to hazardous conditions that could result in injury. However, safety concerns must be addressed with all alternatives, even when considering a "No Action" approach. Different safety measures that may need to be employed are therefore included and scored in the Present Worth Cost and Ease of Operations criteria.
E) Ability to Expand	Ability to expand and adapt a process for greater loading and/or to address changes in permit requirements.
F) Energy Efficiency	Overall efficiency of the alternative, energy use, carbon footprint, and consumption of non-renewable resources.
G) Odor Potential	Potential of an alternative to cause foul odors during operations through the course of a year.
H) Ease of Operations	Ease of operations and complexity of the process, including the need for specialized operators and process control / testing.
I) Ease of Disposal (Biosolids only)	Ability to find suitable disposal sites for biosolids; also used to differentiate perceived quality or handling impacts of biosolids that attain the same 503b classification.

[(a)] *Safety concerns must be addressed with all alternatives, even when considering a "No Action" approach. Different safety measures that may need to be employed are therefore included and scored in the Present Worth Cost and Ease of Operations criteria.*

A pairwise analysis was then performed to compare the relative importance of one criterion to another; e.g. which is more important, Present Worth Cost or Permit Compliance? Relative importance was scored as follows:

- 5 – significantly more important

- 4 – more important
- 3 – equally important
- 2 – less important
- 1 – significantly less important

The result of the pairwise analysis is shown in **Table 4.** Safety is a major concern for the City; however, it is imperative that safety concerns be addressed with all alternatives, even when considering a "No Action" approach. Safety measures and the costs must therefore be incorporated into every alternative. Safety can then effectively be scored in the Present Worth Cost and Ease of Operations criteria.

Table 4 – Pairwise Analysis Results

Criteria	A) Present Worth Cost	B) Permit Compliance	C) Reliability	D) Safety	E) Ability to Expand	F) Sustainability	G) Odor Potential	H) Ease of Operations	Total Score	Weight
A) Present Worth Cost	-	1	2	1	3	4	1	2	14	8.3%
B) Permit Compliance	5	-	4	3	4	4	4	4	28	16.7%
C) Reliability	4	2	-	2	3	4	1	3	19	11.3%
D) Safety [(a)]				-						
E) Ability to Expand	3	2	3	1	-	4	1	3	17	10.1%
F) Energy Efficiency	2	2	2	1	2	-	1	2	12	7.1%
G) Odor Potential	5	2	5	2	5	5	-	5	29	17.3%
H) Ease of Operations	4	2	3	2	3	4	1	-	19	11.3%
I) Ease of Disposal	5	3	4	-	5	5	4	4	30	17.9%

(a) Safety concerns must be addressed with all alternatives, even when considering a "No Action" approach. Different safety measures that may need to be employed are therefore included and scored in the Present Worth Cost and Ease of Operations criteria.

Alternatives may be compared by scoring each alternative in a category from 1 (least favorable) to 5 (most favorable). The raw score is then multiplied by the criterion's weight to provide an overall score for the alternative.

Alternative Comparison

A workshop was held with City staff on July 6th, 2020 to evaluate each biosolid management alternative from 1 to 5 based on the criteria. The evaluation score was multiplied by the weight from the pair-wise analysis for each criterion and summed for an overall score. The results of the alternative ranking are shown in **Table 5**.

The City decided that MB's Alternative 5 should be evaluated against the Facilities Plan's Alternative 4 Phase 2 and Phase 4 improvements so that both Alternatives are meeting Class A requirements. The facility plan previously had ranked Alternative 4 for biosolids to meet Class B only. The rankings for Alternative 1, 2, and 3 remained unchanged from what was previously done in the Facilities Plan. Each criterion was discussed, and the City ultimately made the decision on the scoring given for each criterion. The Florida Green, Alternative 5, ranked highest.

Table 5 – Biosolids Alternatives Ranking

Criteria	Alternative 1: No Action	Alternative 2: Mechanical Dewatering of Unstabilized Solids	Alternative 3: Mechanical Dewatering with Lime Stabilization	Alternative 4: Anaerobic Digestion and Dewatering	Alternative 5: Florida Green	Weight
A) Present Worth Cost	5	3	2	1	1.4	8.3%
B) Permit Compliance	5	2	5	5	5	16.7%
C) Reliability	5	2	4	4	4	11.3%
D) Safety	-	-	-	-	-	-
E) Ability to Expand	1	4	4	3	5	10.1%
F) Energy Efficiency	3	5	4	5	5	7.1%
G) Odor Potential	1	1	2	4	4.5	17.3%
H) Ease of Operations	5	4	2	4	4.5	11.3%
I) Ease of Disposal	5	2	3	4	4	17.9%
Weighted Score	**3.76**	**2.55**	**3.25**	**3.89**	**4.27**	**100%**

Appendices

Appendix A – Photos of Florida Green Facility

Appendix B1 – Florida Green Adjusted Cost Estimate

Appendix B2 – Engineer Opinion of Probable Cost

Appendix B3 – Initial Planning Level Cost Estimate

Appendix C – Conceptual Site Layout Figure 1 and Figure 2

J·U·B ENGINEERS, INC.

Appendix A

Florida Green Facility Photos

Odor Control / Ventilation Duct

Nearly Dry Biosolids in Greenhouse

Wetter Biosolids in Greenhouse

Drying Biosolids

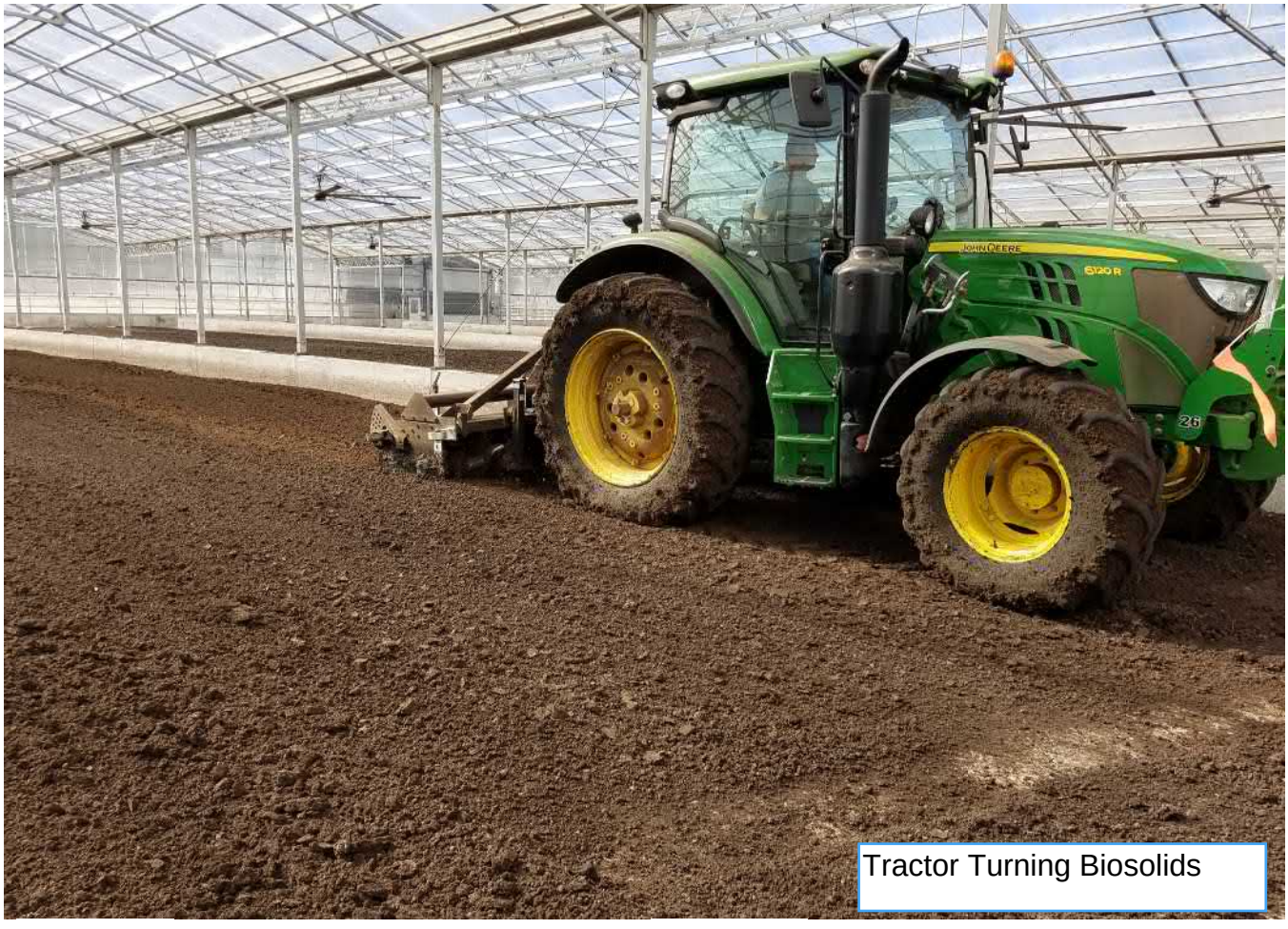
Conveyor Feed to Thermal Unit

Conveyor Feed Hopper

Drying Biosolids

Class A Biosolids, Final Product

Load Out Bay



Tractor Turning Biosolids

Appendix B1

Florida Green Opinion of Cost Estimate

ENGINEER'S OPINION OF PROBABLE COST (From Ted Merrell)

PROJECT: City of Kennewick WWTP Facility Plan Biosolids Alt 5

DATE: 6/5/2020

PROJECT DESCRIPTION: Class A Biosolids via Solar Drying / Pasteurization

CLIENT: City of Kennewick, WA

CLIENT PROJ. NO.

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Mob/Demob	1	LS	$500,000	$500,000
2	Engineering, permitting, desgin schedule, surveying, as-builts	1	LS	$576,263	$576,263
3	Greenhouses	16	EA	$155,333	$2,485,328
4	Site work	1	LS	$1,147,454	$1,147,454
5	Greenhouse odor control units	16	LS	$225,518	$3,608,288
6	Dewatering Filter Presses	1	LS	$1,750,000	$1,750,000
7	Sludge Storage Tank	1	LS	$950,000	$950,000
8	Installation of Sludge Storage Tank	1	15%	$262,500	$262,500
9	Insurance and Bonding	1	LS	$223,056	$223,056
10	Circulation Fans	50	EA	$5,385	$269,250
11	Electrical and Controls	1	LS	$1,311,234	$1,311,234
12	Process Conveyors	1	LS	$315,698	$315,698
13	Thermal Unit and Cyclone	1	LS	$652,656	$652,656
14	Day Hopper	1	LS	$106,027	$106,027
15	Water, Sewer and Gas to Site	1	LS	$117,808	$117,808
16	Testing and CM	1	LS	$94,250	$94,250
17	Control Room	1	LS	$176,000	$176,000
18	Process Building	1	LS	$649,000	$649,000
19	Process Room Ventilation and Odor Control	1	LS	$814,000	$814,000
20	Loadout Building	1	LS	$306,000	$306,000
21	Fire Alarm and Sprinkler	1	LS	$74,220	$74,220
22	Drainage	1	LS	$11,780	$11,780
23	Radient Floor Heat System	1	LS	$395,000	$395,000
24	Tractor	1	LS	$135,000	$135,000
25	Fork Lift	1	LS	$20,000	$20,000
26	Wheeled Payloader	2	EA	$80,000	$160,000
27	Tillers	2	EA	$14,000	$28,000
28	Scissor Lift	1	LS	$12,500	$12,500
29	ATV hauler	1	LS	$10,000	$10,000
30	Lab Gear	1	LS	$12,500	$12,500
31	Misc. Equipment	1	LS	$12,500	$12,500

SUBTOTAL	$ 17,186,312
Contingency: 20%	$3,437,000
Prevailing Wages: N/A	-
State Sales Tax: 8.3%	$1,426,000
Design / CMS: 20%	$0
Legal and Administrative: 1%	$0
TOTAL PROBABLE COST (2020 DOLLARS)	**$ 22,049,312**

Notes: Contingency is applied to Subtotal

Major Operation and Maintenance Annual Cost				
Electricity	2,000,000	kw/yr	$0.06	$120,000.00
Labor	12,480	hr/yr	$40	$499,200.00
Natural Gas	121,472	therm/yr	$0.85	$103,251.58
Deisel Fuel	7,500	gallons	$2.00	$15,000.00
Misc. repair and parts			1.0%	$78,436.16
Total =				$815,887.74
Present Value of Annual Cost (20yr @ 5%) =				**$10,167,764.7**
Alternative Present Value Cost Estimate =				$ 32,200,000

NO.	DESCRIPTION	BASIS OF COST
1	Mob/Demob	Includes all mob/demob costs for construction. Actual Schedule Value for Florida
2	Engineering, permitting, design schedule, surveying, as-builts	Includes all Engineer of Record Costs. Actual from Florida
3	Greenhouses	Represents all engineering, drawings, materials and installation. Based on updated Quotes for 2020
4	Site work	This was drawn from Florida. This included 50,000 cubic yards of site earth work in addition to geotechnical and anomoly grout pumping, filtration testing and all compaction density testing. Site work was extensive due to uneven surface conditions and the clearing of 8.5 acres of trees.
5	Greenhouse odor control units	Represents all engineering, drawings, materials, activated carbon and installation
6	Dewatering Filter Presses,	Represents all engineering, drawings, materials, conveyors, pumps, boosters, controls, catwalks and grinders
7	Sludge Storage Tank	Represents Sludge Storage Tank, Decant system, Pumps, Piping and Effluent pumping to the manhole located on the northeast corner of the lagoon cells. (same manhole used for lagoon dewatering projects untilizing up to 10 mobile belt presses).
8	Installation of Sludge Storage Tank	This item is included but all depends on the actual tank size and configuration to be determined
9	Insurance and Bonding	Actual insurance and bonding cost for complete Florida project.
10	Circulation Fans	Updated 2020 fan pricing
11	Electrical and Controls	Actual from Florida plus with additional units included
12	Process Conveyors	Includes Feed Conveyor and Loadout Conveyor.
13	Thermal Unit and Cyclone	Updated 2020 Pricing
14	Day Hopper	Expanded Pricing from lorida Project
15	Water, Sewer and Gas to Site	Florida Data
16	Testing and CM	Actual based on DB Agreement
17	Control Room	HVAC controlled Area for Monitoring Systems
18	Process Building	Florida Model Expanded for Application
19	Process Room Ventilation and Odor Control	Based on Florida Model
20	Loadout Building	Based on Florida Model
21	Fire Alarm and Sprinkler	Based on NFPA820 Codes and Occupany Classifications
22	Drainage	Based on Florida Model and only included floor drains
23	Radiant Floor Heat System	Includes Controls
24	Tractor	Florida Model
25	Fork Lift	Florida Model
26	Wheeled Payloader	Florida Model
27	Tillers	One plus spare
28	Scissor Lift	Florida Model
29	ATV hauler	Florida Model
30	Lab Gear	Florida Model
31	Misc. Equipment	Florida Model. Includes small tippers

Contingency: 10%	The advantage of already having the Florida desgin completed and operational for 2 yers we have elimated a majority of the unknowns. The DB project in Florida had a Contingency Allowance of 10%, 1.2 million, and we used less than 50% of that fund.
Design / CMS: 8%	Included in Engineering
Legal and Administrative: 1%	Included in Engineering

Labor	6 FTE's for the maximum option
Natural Gas	Florida uses 4.0224 therms per wet ton incoming. Assuming a 25 % increse for radient heat addition would be 5.028 therms x 24,159.2 wet tons for 3,650 DT. Florida therm cost is $.66/therm
Diesel Fuel	Florida data adjusted for lower wet tons
Misc. repair and parts	Includes Activated Carbon Sinking Fund

Item in JUB's Cost Estimate Not in FG's Cost Estimate	Explaination of where Cost is Included
Catwalk =$ $80,000	Included in Dewatering Filter Press Line Item
Mechanical Piping = $450,000	Included in specific schedules such as Gas Lines to Pasteruizer, Radient Heater, HVAC, Sludge Lines, Decant Lines, Water Lines, etc. Sanitary lines would be from floor drains in process room, sinks, toilets or shower and are included.
Filtrate Pump Station = $500,000	Filtrate from lagoon dewatering project was pumped into manhole to return to plant. A wetwell is included to serve as this purpose.
Yard Piping = $200,000	Underground piping is included for sanitary, effluent and floor drains. No yard piping needed for Greenhouses.
Site Civil = $200,000	This is included in the Engineering line item long with MEP.
Bonding = $100,000	This is included in the Insurance and Bonding entry.
Contractor Overhead and Profit = $399,000	This is included in the individual line items as a cost plus 10% through a Design-Build Agreement.
Control Panels = $25,000	Control Panel are included in item unit pricing.
Freight = $15,000	Included in item unit pricing.
Installation = $97,899	Included in Schedules Unit Pricing
Contractor mobilization and admin. = $344,000	Included in Mob/Demob Schedule
Yard Piping = $172,000	Included in Unit Schedules
Site Civil = $172,000	Included in Unit Schedules
Electrical and Instrumentation = $1,033,000	Included in Unit Schedules
Bonding = $86,000	Included in Unit Schedules
Contractor Overhead and Profit = $344,000	Included in Unit Scedules for DB Agreement
Heating Controls = $75,000	Included in Unit Schedules
Design / CMS = $5,586,000	Included in Unit Schedules
Contingency = $719,731	With already determined Key Components and Designs a 10% Contingency would be more than adaquate so this was reduced to 20% but should be even lower.
Legal and Amin. = $172,000	Not certain what this would be for that isn't covered in Engineering Schedule

Appendix B2

Engineer Opinion of Cost Estimate

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: City of Kennewick WWTP Facility Plan Biosolids Alt 5

DATE: 6/12/2020

PROJECT DESCRIPTION: Class A Biosolids via Solar Drying / Pasteurization

CLIENT: City of Kennewick, WA

CLIENT PROJ. NO.

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Mob/Demob	1	LS	$500,000	$500,000
2	Engineering, permitting, design schedule, surveying, as-builts	1	LS	$576,263	$576,263
3	Greenhouses	16	EA	$155,333	$2,485,328
4	Site work	1	LS	$1,147,454	$1,147,454
5	Greenhouse odor control units	16	LS	$225,518	$3,608,288
6	Dewatering Filter Presses, (price for 3 units)	1	LS	$1,750,000	$1,750,000
7	Sludge Storage Tank	1	LS	$950,000	$950,000
8	Installation of Sludge Storage Tank	1	15%	$262,500	$262,500
9	Insurance and Bonding	1	LS	$223,056	$223,056
10	Circulation Fans	50	EA	$5,385	$269,250
11	Electrical and Controls	1	LS	$1,311,234	$1,311,234
12	Process Conveyors	1	LS	$315,698	$315,698
13	Thermal Unit and Cyclone	1	LS	$652,656	$652,656
14	Day Hopper	1	LS	$106,027	$106,027
15	Water, Sewer and Gas to Site	1	LS	$117,808	$117,808
16	Testing and CM	1	LS	$94,250	$94,250
17	Control Room	1	LS	$176,000	$176,000
18	Process Building	1	LS	$649,000	$649,000
19	Process Room Ventilation and Odor Control	1	LS	$814,000	$814,000
20	Loadout Building	1	LS	$306,000	$306,000
21	Fire Alarm and Sprinkler	1	LS	$74,220	$74,220
22	Drainage	1	LS	$11,780	$11,780
23	Radiant Floor Heat System	1	LS	$395,000	$395,000
24	Tractor	1	LS	$135,000	$135,000
25	Fork Lift	1	LS	$20,000	$20,000
26	Wheeled Payloader	2	EA	$80,000	$160,000
27	Tillers	2	EA	$14,000	$28,000
28	Scissor Lift	1	LS	$12,500	$12,500
29	ATV hauler	1	LS	$10,000	$10,000
30	Lab Gear	1	LS	$12,500	$12,500
31	Misc. Equipment	1	LS	$12,500	$12,500
31.1	Subtotal - Base Cost Estimate = $17,186,000				
32	CCI Ratio 1.155, applied to labor (50% of subtotal)	15.5%	%	$1,331,939	$1,331,939
33					
34	Extend Natural Gas	1	LS	$93,000	$93,000

SUBTOTAL	$	18,611,251
Contingency: 30%		$5,583,000
Prevailing Wages: N/A		-
State Sales Tax: 8.3%		$1,545,000
Design / CMS: 20%		$3,145,737
Legal and Administrative: 1%		$186,000
TOTAL PROBABLE COST (2020 DOLLARS)	**$**	**29,070,988**

This is 20% minus the Engineering Cost from No. 2 above

Notes: Contingency is applied to Subtotal

Major Operation and Maintenance Annual Cost				
Electricity	2,000,000	kw/yr	$0.06	$120,000
Labor	12,480	hr/yr	$60	$748,800
Natural Gas	121,472	therm/yr	$0.85	$103,252
Diesel Fuel	7,500	gallons	$2.00	$15,000
Misc. repair and parts			1.0%	$78,436
Total =				$1,065,488
Present Value of Annual Cost (20yr @ 5%) =				**$13,278,332**
Alternative Present Value Cost Estimate =				$ 42,300,000

Appendix B3

Florida Green Initial Planning Level Cost Estimate

CONSTRUTION ESTIMATES PER MODEL

DESCRIPTION	CURRENT	PROJECTED
Design Phase		
Engineering, permitting, design schedule surveying, as-builts	536,262.96	576,262.96
Construction Phase		
Insurance, Bonding	191,000.76	223,056.02
Mob-Demob	500,684.51	500,684.51
Site Work	957,564.86	1,147,454.93
Greenhouses	1,553,335.45	2,485,336.72
Circulation Fans	172,456.67	269,275.70
Drainage	11,780.81	11,780.81
Odor Control Greenhouses	2,255,184.01	3,608,294.42
Process Building	589,040.59	649,040.59
Pasteurization Unit and Cyclone	652,656.98	652,656.98
Fire Alarm and Sprinklers only in Classified Areas	74,219.12	74,219.12
Day Hopper	106,027.31	106,027.31
Process Conveyors	295,698.38	315,698.38
Control Room	175,908.04	175,908.04
Process Room Ventilation and Odor Control	814,054.11	814,054.11
Loadout Building	306,301.11	306,301.11
Electrical	1,125,345.77	1,311,234.54
Water, Sewer, Gas to Site	117,808.00	117,808.00
Testing, Construction Management	94,248.50	94,248.50
Total Rough Estimate	$ 10,529,577.94	$13,439,342.75
Items Not Included: *Rough Estimates		
*In Floor Heat System for Greenhouse	325,000.00	395,000.00
*Belt Presses, Pumps, Polymer System, Conveyors	1,250,000.00	1,750,000.00
*Sludge Storage Tank, Decant System, Pumps, Piping	950,000.00	950,000.00
Total Project Rough Estimate	$13,054,577.94	$16,534,342.75

OPERATIONAL EQUIPMENT COSTS

EITHER MODEL

Tractor (Front Wheel Assist)	$135,000.00
Material Hoppers	$5,000.00
Fork Lift	$20,000.00
Wheeled Payloader	$80,000.00
Wheeled Payloader	$80,000.00
2 Falc Tillers	$28,000.00
Scissor Lift	$12,500.00
ATV Hauler	$10,000.00
Moisture Analyzer, Lab Oven, Equipment	$12,500.00
Misc. Equipment, Tools	$7,500.00
Total Operational Equipment	$390,500.00

KENNEWICK, WASHINGTON

28 Day Max Process Calculations

Current 2,026 Dry Tons Production

BELT PRESSING STATISTICS

2,026 Dry Tons (DT) = 24,119,047 Gallons Per Year (GPY) @ 2% Solids

24,119,047 GPY / 52 Weeks / 5 Days Per Week = 92,765 Gallons Per Day (GPD)

92,765 GPD / 7 Hours Per Day / 60 Minutes Per Hour = 220 Gallons Per Minute (GPM)

*Assumption: 1 Press = 125 GPM; 2 Presses x 125 GPM = 250 GPM

*Assumption: 2 Presses required to complete dewatering in a 7-hour workday

92,765 GPD x 8.34 lbs. Per Gallon x .02 (2% solids) / 2,000 lbs. Per Ton = 7.79 Dry Tons Per Day (DTPD)

7.79 DTPD / .15 (15% Solids) = 51.94 Wet Tons (WTPD) @ 15% Solids

51.94 WT Per Day x 2,000 lbs. = 103,896 lbs. Per Day

103,896 lbs. / 1,600 lbs. Per Cubic Yard = 64.93 Cubic Yards Per Operating Day (CYPOD)

64.93 CYOPD x 27 Cubic Feet Per Cubic Yard = 1,753.25 Cubic Feet / .66 (8 inches) = 2,656.45 Square Feet @ 8 Inches Thick

2,656.45 Cubic Feet / 41 Feet Wide Receiving Bay = 64.79 Linear Feet Per Day

*Assumption: 144 Feet Bed Length Per Bay Usable = 2 Days of Production Per Bay

28 Days Maximum Dry Time = 10 Greenhouse Bays Needed for Current Production

AIR CIRCULATION STATISTICS

10 Bays x 3 Fans Per Bay = 30 Fans Needed

AIR REMOVAL STATISTICS

420 Feet Wide x 192 Feet Deep x 14 Feet High = 1,128,960 Cubic Feet

Gables = 21 Feet x 5.25 Feet Rise x 192 Feet Deep x 10 Bays = 211,680 Cubic Feet

Total Room Air = 1,340,640 Cubic Feet

1,304,640 Cubic Feet x 11.33 Exchanges Per Hour = 15,189,451 Cubic Feet Per Hour

15,189,451 Cubic Feet Per Hour / 60 Minutes Per Hour = 253,157 Cubic Feet Per Minute Exchange

KENNEWICK, WASHINGTON

OPTIMAL OPERATIONS MODEL

The models that were recalculated are two very different pictures that are helpful for consideration. As discussed in the most recent phone conversation there is a modified model consideration that would allow the use of some existing resources and help to balance the work-load to maximize facilities and equipment in more of a year around scenario. The new 28 Day Model should essentially be sized accordingly to maximize the facility during the very coldest months. However, during the summer months, the greenhouses in particular would only be operating at roughly half capacity. This in itself is gives the space a rest, but the ripple effect is that labor and equipment become very inefficient. The reason for this is that if the greenhouses are operating at half efficiency then the tractor/tiller and the payloader(s) are running much less as well. This creates an interesting option when considering the size of the greenhouse units.

1) If the potential exists to leave at least one of the lagoon cells in operation, then this cell could be used as an excess-solids holding option. Any time operations needed to be halted such as holidays, weather events, pandemics, high flows, repairs and maintenance, etc. solids could be diverted to the lagoon. If the initial construction project sizing was considered based on the current production flow model, then any growth volumes could also be seasonally absorbed into the lagoon cell. As the flows increased so would the contribution to the lagoon. The key being that instead of waiting until the lagoon solids became excessive, or had an opportunity to become odorous a small remote control dredge unit could be utilized each summer to bring solids into the sludge storage tank and those solids could be dewatered and used to fill excess capacity in the greenhouses. This would allow the greenhouse operations to stay much more consistent and therefore maximize the capital investment that was made by making it as efficient as possible. Essentially, you would maximize facility utilization and solids throughout without additional capital being spent. If down the road the flows did grow to a level that would warrant expansion of the greenhouse space, that could easily be added because you could install the infrastructure during the initial construction phase to make the expansion very simple to do. At that later point and time, the history of the facility would be available to properly size any expansion based on real data.

GREENHOUSE DETAIL STATISTICS

There several design items that are consistent across model designs. The primary difference between the current flow design and the 20-year projected flow design is simply the number of bays, odor control units and circulation fans.

The Current Flow Sizing would be 420 Feet Long by 192 Feet Deep.

The 20-year Projected Flow Sizing would be 672 Feet Long by 192 Feet Deep.

The actual size greenhouses can certainly be altered from the existing length and depth. The primary size of a 42 feet wide center on center bay width is something that I would recommend stay consistent as that width works well for the tractor/tiller and the payloaders. They other consideration then comes down to maximizing the odor control air flows by making sure the width of the air duct systems match up to the potential for the air exchanges. More could be shared on this issue later.

Other considerations would be commonly shared regardless of the size chosen. Some of those items would be:

1) 14 feet eave height
2) 24 feet turn around lane on either end
3) 12 feet header clearance
4) Overhead doors on all corners with vapor protection, stainless components
5) Adequate walk through doors to meet exit fire codes
6) Glass roofs
7) Acrylic sides and gable ends
8) Knee walls

LABOR FTE REQUIREMENTS PER JOB DESCRIPTION

Category	Current 2,026 DT Production	Projected 3,650 DT Production
Presses/Pasteurizer	1.0	1.75
Payloader(s)	1.0	1.75
Tractor / Tiller	.75	1.0
Supervisor / Swing	1.0	1.0
*Total FTE's Per Model	3.75	5.5

*Full Time Equivalent (FTE) Based on 8 Hour Days

*These FTE's are assuming Maximum Capacity. Summer Operations would be drastically reduced for Tractor / Tiller and Payloader(s) for both models due to rapid drying times in greenhouse bays.

KENNEWICK, WASHINGTON

28 Day Max Process Calculations

20 Year Projected 3,650 Dry Tons Production

BELT PRESSING STATISTICS

3,650 Dry Tons (DT) = 43,452,380 Gallons Per Year (GPY) @ 2% Solids

43,452,380 GPY / 52 Weeks / 5 Days Per Week = 167,125 Gallons Per Day (GPD)

167,125 GPD / 7 Hours Per Day / 60 Minutes Per Hour = 397 Gallons Per Minute (GPM)

*Assumption: 1 Press = 125 GPM; 2 Presses = 250 GPM; 3 Presses = 375 GPM

*Assumption: 3 Presses running 7.42 hours per day required to complete dewatering

167,125 GPD x 8.34 lbs. Per Gallon x .02 (2% Solids) / 2,000 lbs. Per Ton = 13.93 Dry Tons Per Day (DTPD)

13.93 DTPD / .15 (15% Solids) = 92.92 Wet Tons (WTPD) @ 15% Solids

92.92 WT Per Day x 2,000 lbs. = 185,840 lbs. Per Day

185,840 lbs. / 1,600 lbs. Per Cubic Yard = 116.15 Cubic Yards Per Operating Day (CYPOD)

116.15 CYPOD x 27 Cubic Feet Per Cubic Yard = 3,136.05 Cubic Feet / .66 (8 Inches) = 4,751.59 Square Feet @ 8 Inches Thick

4,751.69 Square Feet / 41 Feet Wide Receiving Bay = 115.89 Linear Feet Per Day

*Assumption: 144 Feet Bed Length Per Bay Usable = 1.24 Days of Production Per Bay

28 Days Maximum Dry Time = 16 Bays Needed for 20 Year Projection

AIR CIRCULATION STATITICS

16 Bays x 3 Fans Per Bay = 48 Fans Needed

AIR REMOVAL STATISTICS

672 Feet Wide x 192 Feet Deep x 14 High = 1,806,336 Cubic Feet

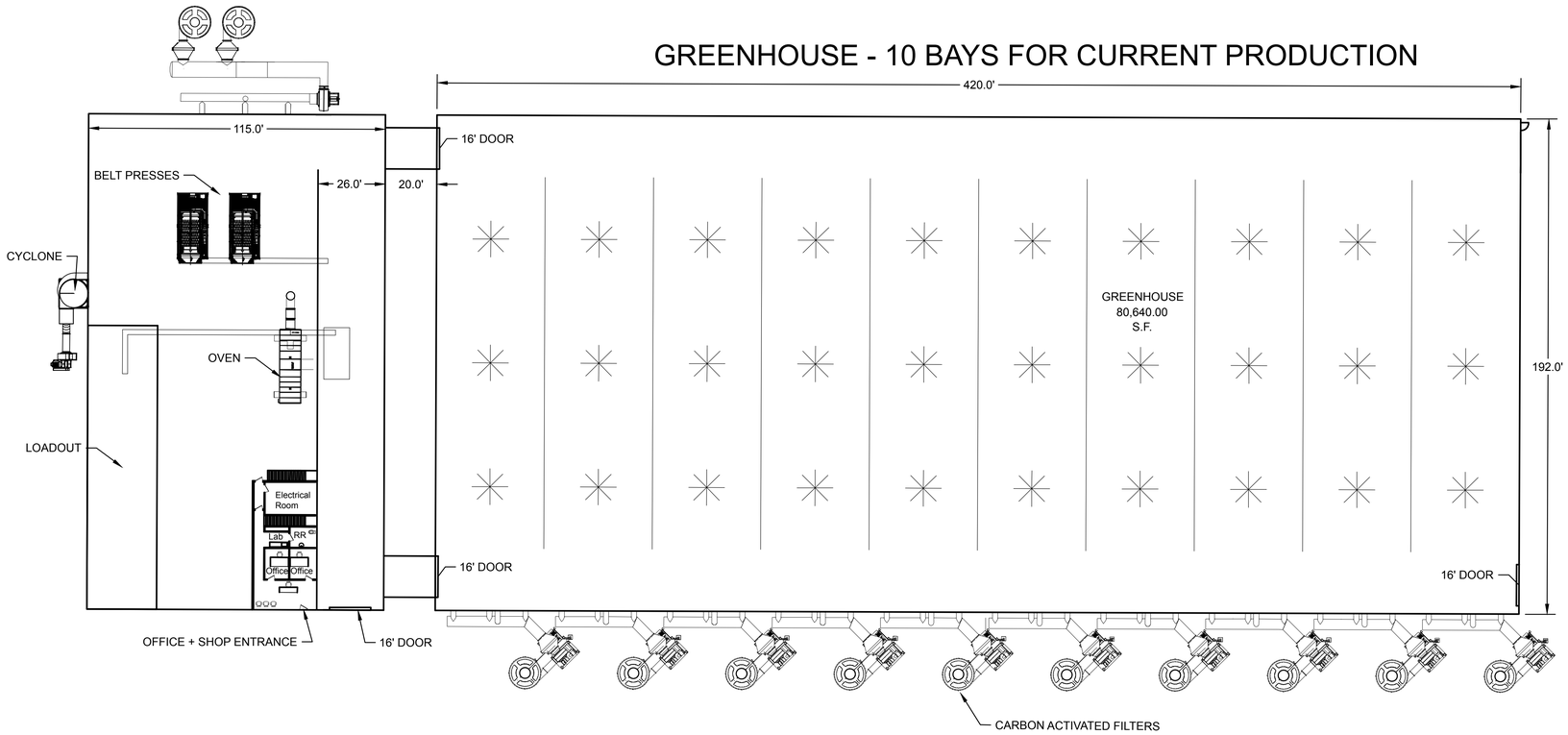
Gables = 21 Feet x 5.25 Feet Rise x 192 Feet Deep x 16 Bays = 338,688 Cubic Feet

Total Room Air = 2,145,024 Cubic Feet

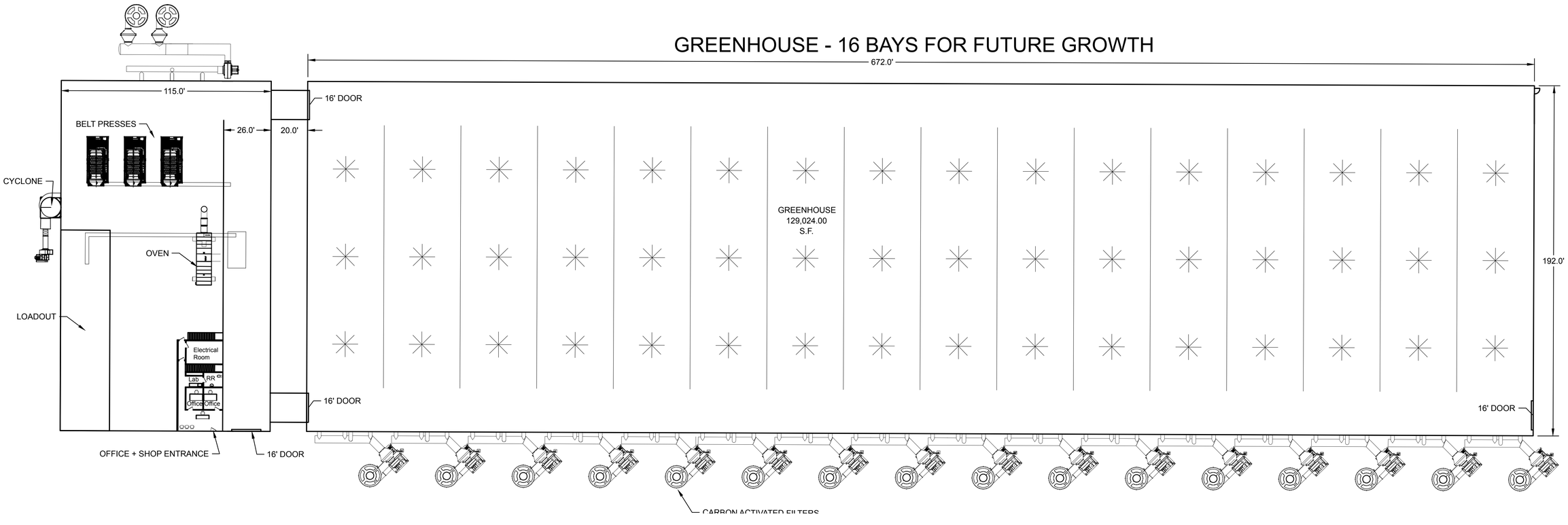
2,145,024 Cubic Feet x 11.33 Exchanges Per Hour = 24,303,121 Cubic Feet Per Hour

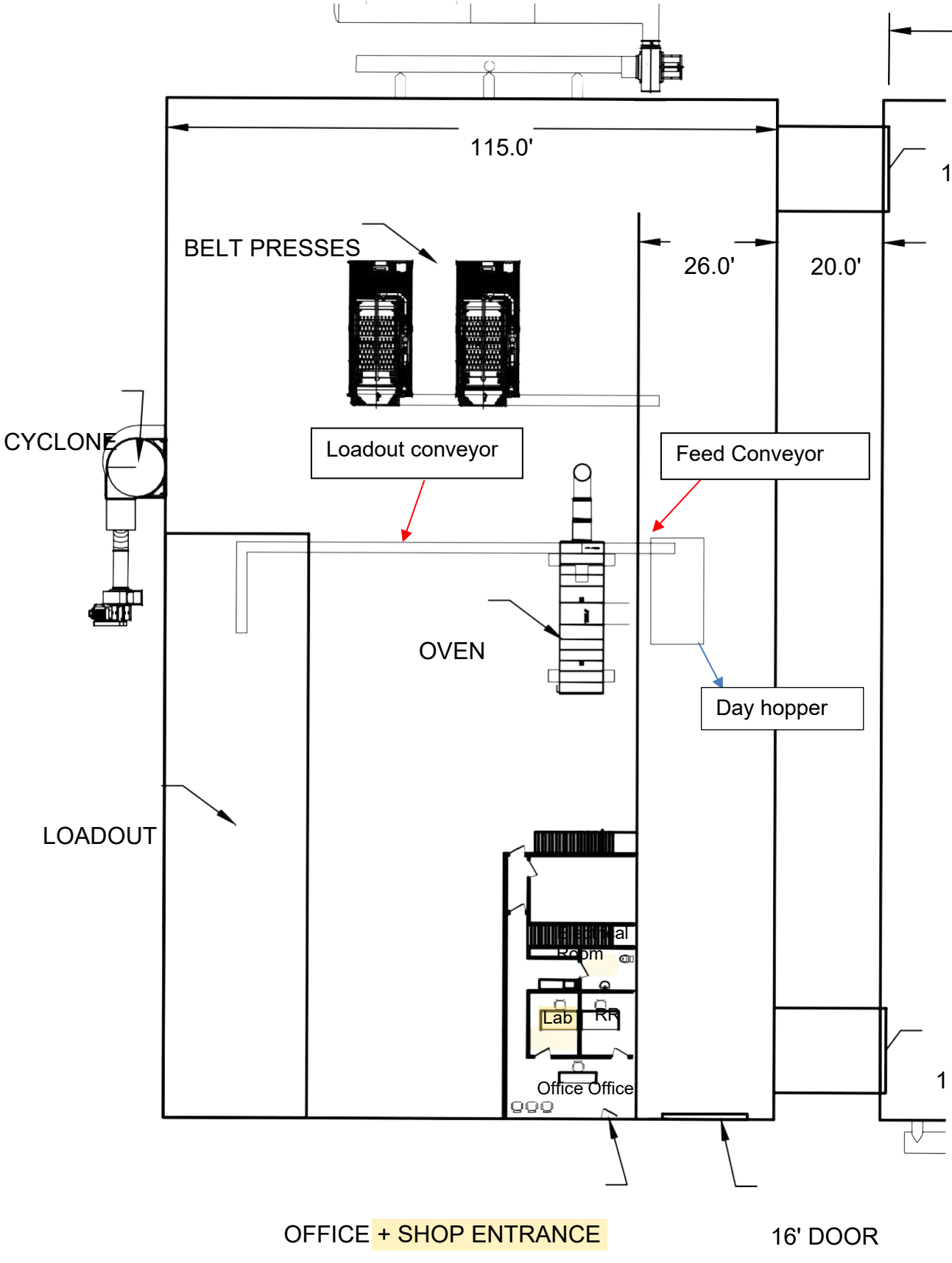
24,303,121 Cubic Feet Per Hour / 60 Minutes Per Hour = 405,052 Cubic Feet Per Minute Exchange

GREENHOUSE - 10 BAYS FOR CURRENT PRODUCTION



GREENHOUSE - 16 BAYS FOR FUTURE GROWTH




115.0'
BELT PRESSES
26.0'
20.0'
CYCLONE
Loadout conveyor
Feed Conveyor
OVEN
Day hopper
LOADOUT
Electrical Room
Lab
RR
Office
Office
OFFICE + SHOP ENTRANCE
16' DOOR

Appendix C

Conceptual Layout
Figure 1 and
Figure 2

CITY OF KENNEWICK PROPERTY

COLUMBIA RIVER

SANITARY SEWER

CONNECT TO EXISTING SANITARY SEWER

NUTMEG ST.

OAK ST.

FENCING

FUTURE EXPANSION AREA

WAS PIPE

NATURAL GAS

GATE

POTABLE WATER

CONNECT TO EXIST. POTABLE WATER

INTERMEDIATE CLARIFIER NO 1

CONNECT TO EXIST. WAS PIPE

INTERMEDIATE CLARIFIER NO 2

RAS/WAS PUMP STATION

LAGOON #2

LAGOON #1

E. 3RD AVE.

NATURAL GAS PIPE BORE BELOW TRACKS

BNSF RAILROAD

BNSF RAILROAD

COLUMBIA DR.

E. CHEMICAL DR.

NATURAL GAS CONNECT TO EXISTING

0 100 200

SCALE IN FEET

LAST UPDATED: 7/7/2020

SHEET NUMBER:

1

Plot Date:7/7/2020 \\UB.COM\CENTRAL\CLIENTS\WA\KENNEWICKCITY\PROJECTS\30-20-046_SOLIDSREEVAL\DESIGN\CAD\EXHIBITS\30-20-046_C-901.DWG

OAK ST

NUTMEG ST.

SANITARY SEWER PIPE

CRUSHED ROCK SURFACING

672'

115'

20'

192'

BELT PRESSES

CYCLONE

OVEN

DAY HOPPER

LOADING DOCK

ELECTRICAL ROOM

Electrical Room

LAB RR

Lab RR

OFFICES

Office Office

NATURAL GAS

ELECTRICAL SERVICE

POTABLE WATER

ASPHALT PAD

GREENHOUSE

10 BAYS FOR CURRENT PRODUCTION

6 BAYS FOR DESIGN 3,650 DT/YR PRODUCTION

FUTURE EXPENSION AREA

CARBON FILTER, TYP.

STORMWATER SWALE

CRUSHED ROCK SURFACING

NATURAL GAS

WAS PIPE

LAGOON #2

0 30 60

SCALE IN FEET

LAST UPDATED: 7/7/2020

SHEET NUMBER:

2

Plot Date:7/7/2020 \\UB.COM\CENTRAL\CLIENTS\WAKENNEWICKCITYPROJECTS\30-20-046_SOLIDSREEVALDESIGN\CAD\EXHIBITS\30-20-046_C-902.DWG