Lake Whatcom Water and Sewer District

Sudden Valley WTP Assessment Project

February 10, 2021, 6:30 PM

Project Team: Russ Porter, Keith Stewart, Myron Basden, Aaron Pease, Jason Newquist

Presentation Outline

- Project Description & Purpose
- Sudden Valley WTP
- Project Goals
- Project Approach
- Summary of Alternatives
- Next Steps

Project Description & Purpose

- South Shore Water System Assessment
  - Assess conditions at Sudden Valley WTP
  - Provide basis for decision making with regards to WTP modifications and/or continued use
    - Phase I (Previous)
      - Assess existing condition of structures and equipment
      - Compile findings and complete Assessment Report
    - **Phase II (Current)**
      - **Prepare Technical Memoranda (a la carte)**
      - **Prepare final alternatives analysis (Capital Improvements Plan for the SVWTP)**

Project Goals

- Phase I – WTP Assessment
  - Assess physical condition of WTP & equipment
- Phase II - Alternatives Analysis
  - Assess alternatives for each treatment system
  - Provide recommendations for WTP modifications
    - G1 - Maintain exceptional WQ performance record
    - G2 - Accommodate immediate need for additional space and separation of chemicals/electrical equipment
    - G3 - Provide adequate equipment and process redundancy
    - G4 - Improve access and flexibility for equipment repair/rehabilitation and/or future expansion
    - G5 - Provide capacity for full buildout flow (1,400 gpm)
    - G6 - Provide treatment equipment for 30-50 year time period

Project Approach

Schedule

	Board Meeting Dates								
	Sep-09	Oct-14	Nov-11	Dec-09	Jan-13	Feb-10	Mar-10	Apr-14	May-12
Scope of Work Item	Sep-30	Oct-28	Nov-25	Dec-30	Jan-27	Feb-24	Mar-31	Apr-28	May-26
1 Project Management									
2.1 Pump Performance Test									
2.2 Chemical Systems Analysis									
2.3 Disinfection Systems Analysis									
2.4 Backwash Systems Analysis									
2.5 Filtration System Analysis									
2.6 Tier 2/3 Seismic and Structural Analysis									
2.7 Structural/Arch Workspace Analysis									
2.8 NACE III Coating Inspection									
2.9 Risk Assessment and Project Prioritization									
2.10 Draft Alternatives Analysis Report									
2.11 Draft Alternatives Analysis Meeting									
2.12 Final Alternatives Analysis Report									
2.13 Alternatives Analysis Board Presentation									
2.14 Financial Analysis Board Meeting									
3 Quality Assurance/Quality Control									

NOTATION LEGEND	
p	Planned (labor not started)
a	Active (labor underway)
c	Completed (no further labor needed)
t	Target Completion

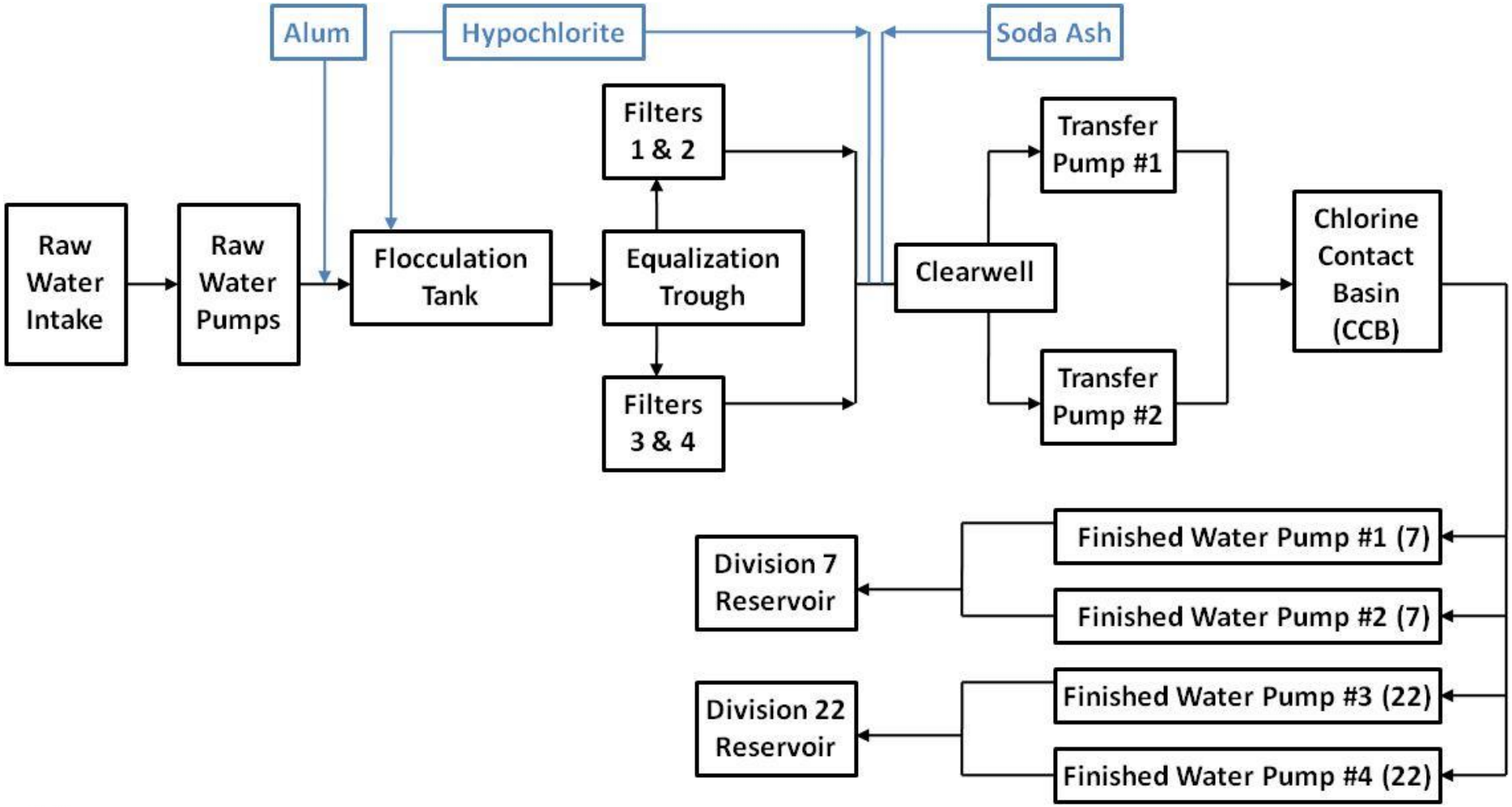
Project Approach

Schedule

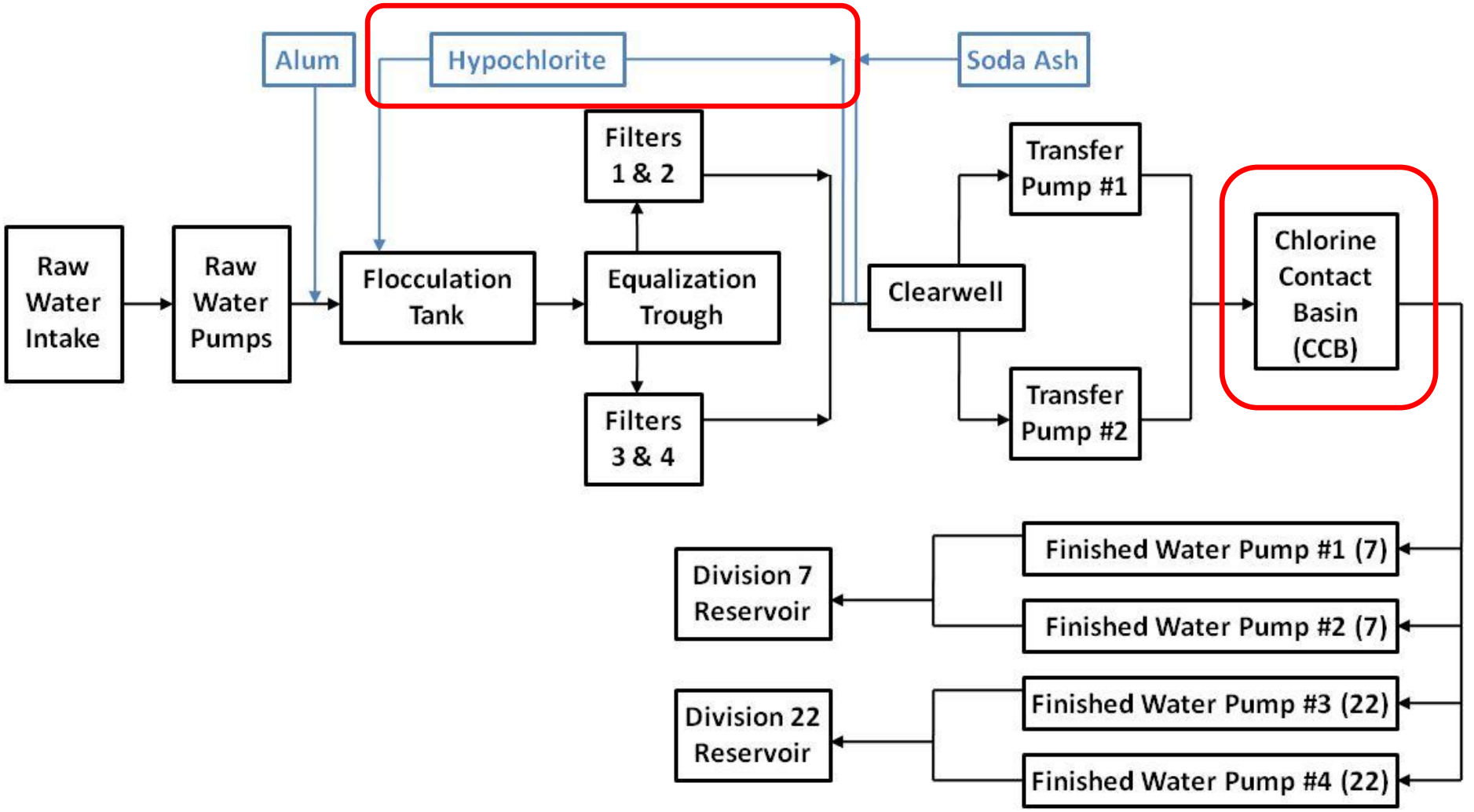
Scope of Work Item	Board Meeting Dates								
	Sep-09	Oct-14	Nov-11	Dec-09	Jan-13	Feb-10	Mar-10	Apr-14	May-12
	Sep-30	Oct-28	Nov-25	Dec-30	Jan-27	Feb-24	Mar-31	Apr-28	May-26
1 Project Management	c	c	c	c	c	a	a	a	t
2.1 Pump Performance Test	c								
2.2 Chemical Systems Analysis	c	c	c						
2.3 Disinfection Systems Analysis			a	a	t				
2.4 Backwash Systems Analysis			a	a	t				
2.5 Filtration System Analysis		c	c	c					
2.6 Tier 2/3 Seismic and Structural Analysis	c	c	c						
2.7 Structural/Arch Workspace Analysis					p	t			
2.8 NACE III Coating Inspection	c								
2.9 Risk Assessment and Project Prioritization						p	t		
2.10 Draft Alternatives Analysis Report						p	t		
2.11 Draft Alternatives Analysis Meeting							t		
2.12 Final Alternatives Analysis Report							p	t	
2.13 Alternatives Analysis Board Presentation									t
2.14 Financial Analysis Board Meeting									
3 Quality Assurance/Quality Control	c	c	c	c	c	a	a	a	t

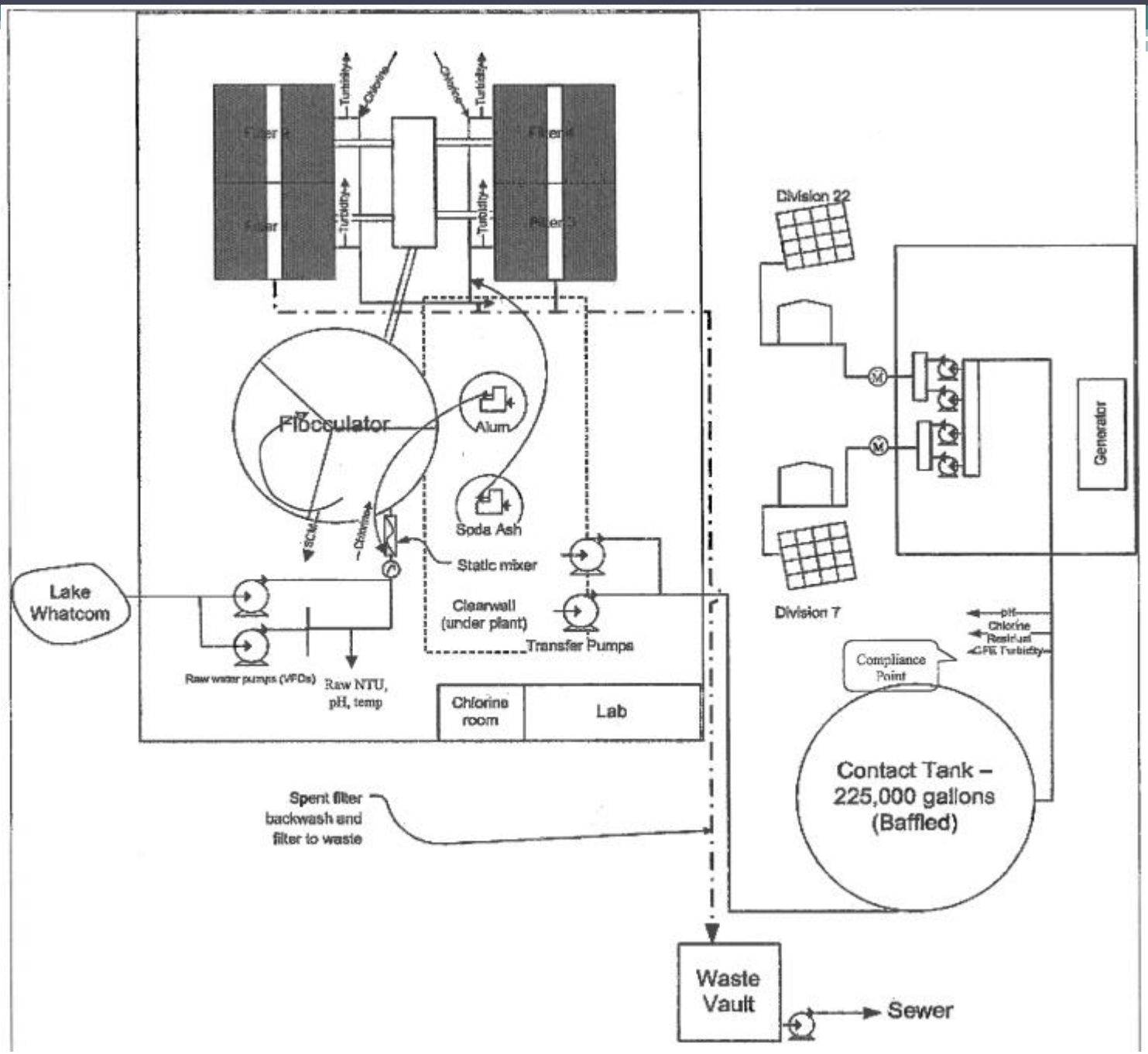
NOTATION LEGEND	
p	Planned (labor not started)
a	Active (labor underway)
c	Completed (no further labor needed)
t	Target Completion

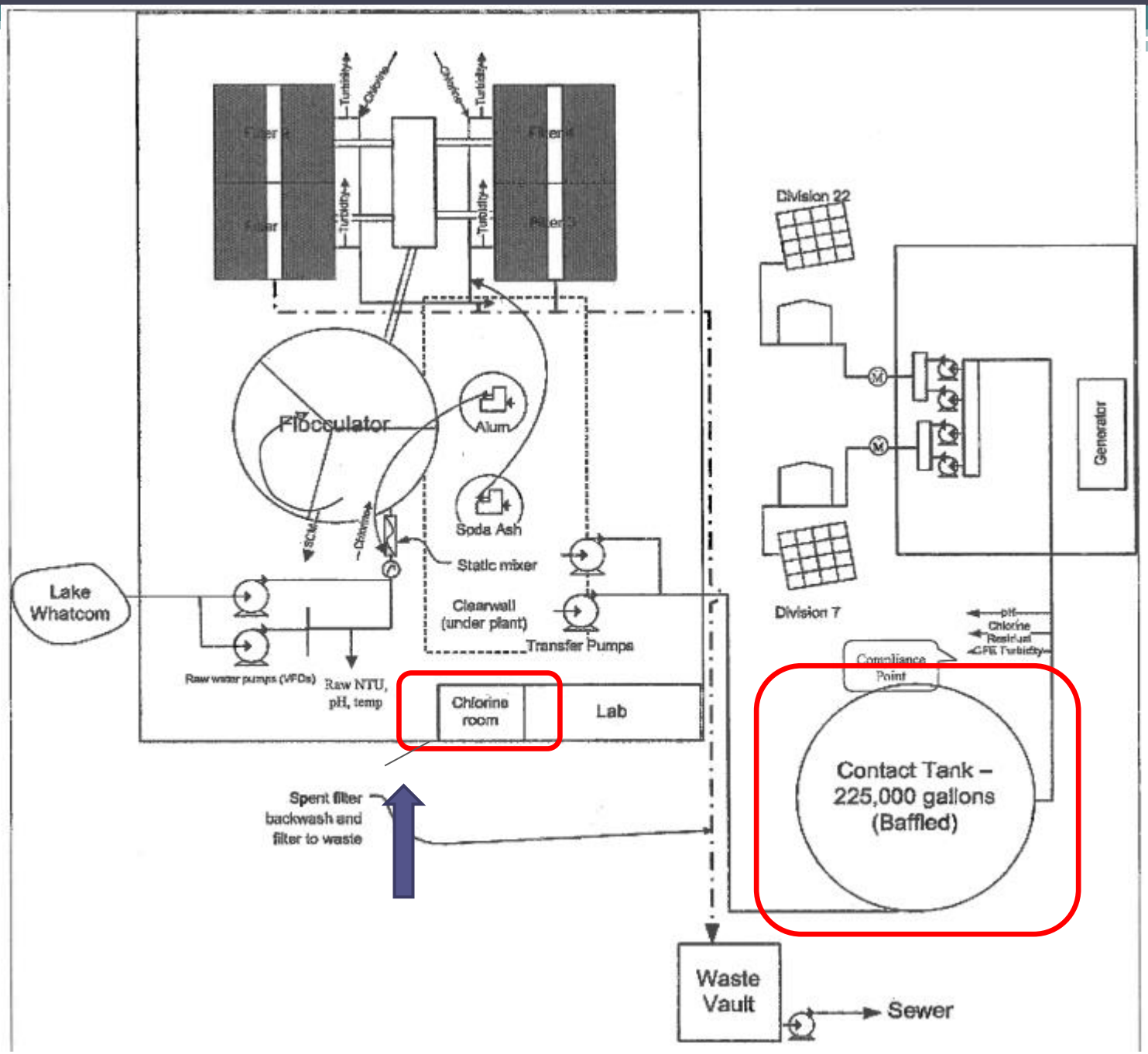
Sudden Valley WTP – Process Flow



Sudden Valley WTP – Process Flow




Turbidity
Chlorine
Turbidity
Turbidity
Turbidity
Flocculator
Alum
Soda Ash
Static mixer
Chlorine
Lake Whatcom
Clearwell (under plant)
Transfer Pumps
Raw water pumps (VFDs)
Raw NTU, pH, temp
Chlorine room
Lab
Division 22
Division 7
Generator
pH
Chlorine Residual
CPE Turbidity
Compliance Point
Contact Tank – 225,000 gallons (Baffled)
Spent filter backwash and filter to waste
Waste Vault
Sewer


Turbidity
Chlorine
Filter 4
Filter 3
Flocculator
Alum
Soda Ash
Static mixer
Clearwell
(under plant)
Transfer Pumps
Lake
Whatcom
Raw water pumps (VFDs)
Raw NTU,
pH, temp
Chlorine
room
Lab
Spent filter
backwash and
filter to waste
Division 22
Division 7
Generator
pH
Chlorine
Residual
CFE Turbidity
Compliance
Point
Contact Tank –
225,000 gallons
(Baffled)
Waste
Vault
Sewer

Summary of Alternatives
Disinfection

- Existing system
  - Gas chlorine
    - 2 active cylinders, 2 spare cylinders
    - Gas injected to flocculation tank and filtered water discharge
    - 7-10 pounds per day
  - Minor “housekeeping” items identified in Assessment Report
  - System does not meet ***current*** safety codes

Summary of Alternatives

- Disinfection
  - Chlorine Gas
  - Onsite Hypochlorite Generation
  - Bulk Hypochlorite

Summary of Alternatives

Disinfection Alternative 1: Chlorine Gas

- Existing system without modifications
  - Maintain use of existing equipment
  - Address minor "housekeeping" items
- Existing system with modifications
  - Complete minor "housekeeping" items
  - Bring into compliance with current safety codes
    - Seismic bracing, chemical storage, fire alarm/suppression
- New system
  - Provide completely new equipment
  - Store/operate within a new, separate building
  - Building will be fully code and safety compliant

Summary of Alternatives

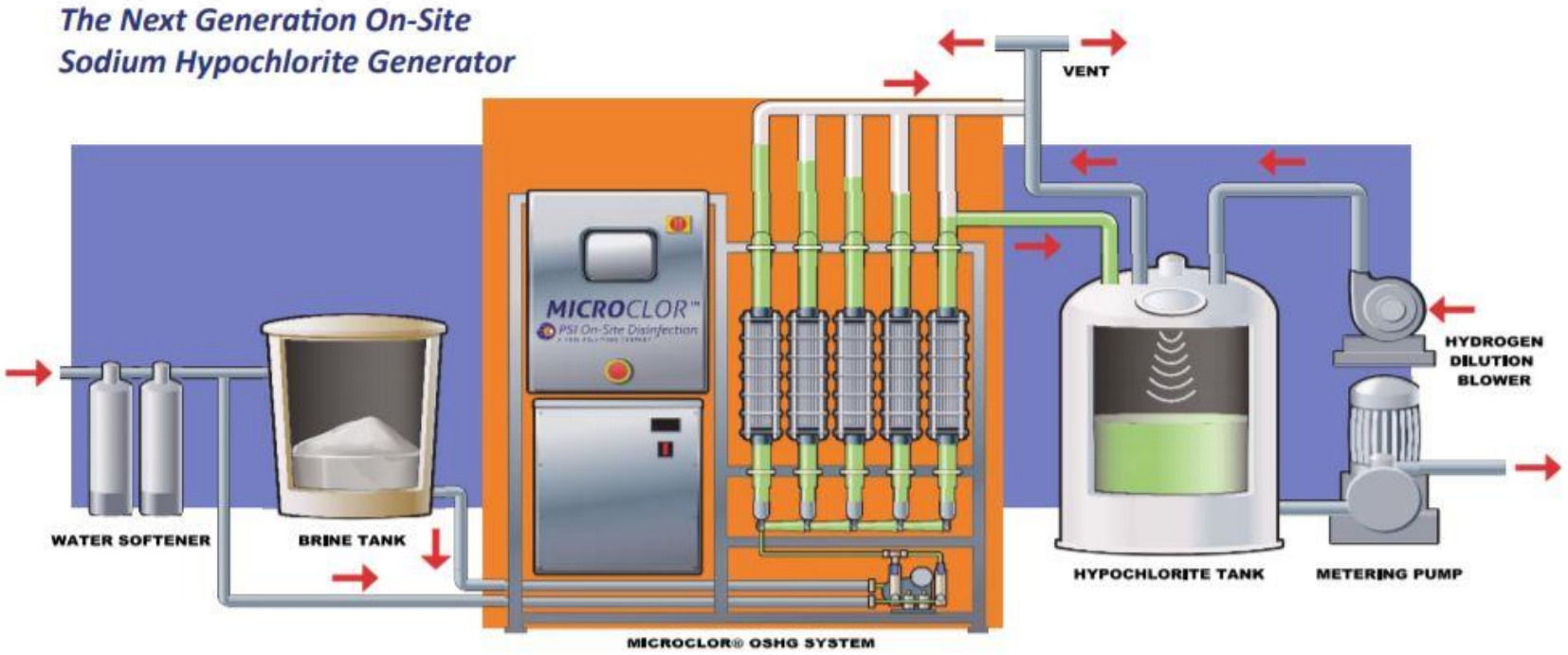
Disinfection Alternative 2: OSHG

- New OnSite Hypochlorite Generation

Summary of Alternatives

Disinfection Alternative 2: OSHG

- New OnSite Hypochlorite Generation



*** Schematic courtesy of PSI.*

Summary of Alternatives

Disinfection Alternative 2: OSHG

- New OnSite Hypochlorite Generation

*** Photos courtesy of PSI.*

Summary of Alternatives

Disinfection Alternative 2: OSHG

- New On Site Hypochlorite Generation (OSHG)
  - New
    - Water softener & brine system,
      - Will require manual salt addition (1 bag / 2 days)
    - OSHG equipment,
    - Hypochlorite storage and metering pump equipment
  - Installed/operated within a new, separate building
  - Allow for repurposing of existing chlorine room

Summary of Alternatives

Disinfection Alternative 3: Bulk Hypochlorite

- Commercial delivery of hypochlorite solution
  - Delivery as 12.5%,
    - Bulk, drums, mini-totes
    - <500 gallons
  - Dilution down to 5-6%
  - Installed/operated within a new, separate building
  - New storage and metering pump equipment

Alternative Comparison

Disinfection Cost, Benefits, & Drawbacks

No.	Description	Capital Cost* (2020)	Advantage	Disadvantage
1	Gas - Existing	$50,000	- Familiar	- Gas safety - Does not meet ***current*** codes
2	Gas - Modified	~$271,000	- Familiar - Meets ***current*** codes	- Gas safety
3	Gas - New	~$725,000	- Familiar - Meets ***current*** codes	- Gas safety - New building - Land & permits
4	OSHG	~$1,510,000	- Common technology - Used throughout WA	- New building - Land & permits - New technology
5	Bulk	~$836,000	- Easy, simple - Low maintenance	- New building - Land & permits - Reliance on vendors

* Capital costs listed are for these alternatives only, and do not include recommendations or costs listed for other treatment system components. Total costs will be evaluated as part of the final Alternatives Analysis Report.

Alternative Comparison

Disinfection Goal Accomplishment

No.	Description	Cost	O&M Cost	G1	G2	G3	G4	G5	G6
1	Gas - Existing	$	$	X		X		X	
2	Gas - Modified	$$	$	X		X		X	
3	Gas - New	$$$	$	X	X	X	X	X	
4	OSHG	$$$$	$$	X	X	X	X	X	
5	Bulk	$$$	$	X	X	X	X	X	

G1 - Maintain exceptional WQ performance record
G2 - Accommodate immediate need for additional space and separation of chemicals/electrical equipment
G3 - Provide adequate equipment and process redundancy
G4 - Improve access and flexibility for equipment repair/rehabilitation and/or future expansion
G5 - Provide capacity for full buildout flow (1,400 gpm)
G6 - Provide treatment equipment for 30-50 year time period

Summary of Alternatives
Contact Time

- Existing system
  - Clearwell
  - CCB
    - Does not provide CT for design flows (1,400 gpm)
      - Sufficient only for 700-800 gpm
    - Recommendations listed in Tech Memo #20434-2
    - Does not provide redundancy

Summary of Alternatives

- Contact Time
  - Existing Chlorine Contact Basin (CCB)
  - New, Replacement CCB
  - New, Supplemental CCB

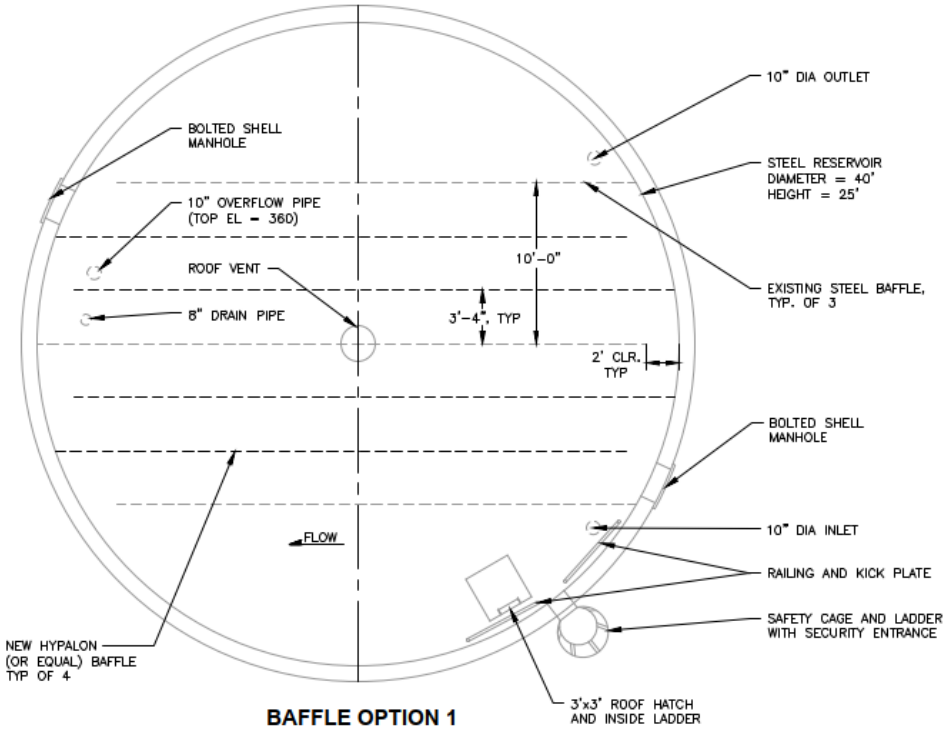
Summary of Alternatives

Contact Time Alternative 1: Rehab Existing CCB

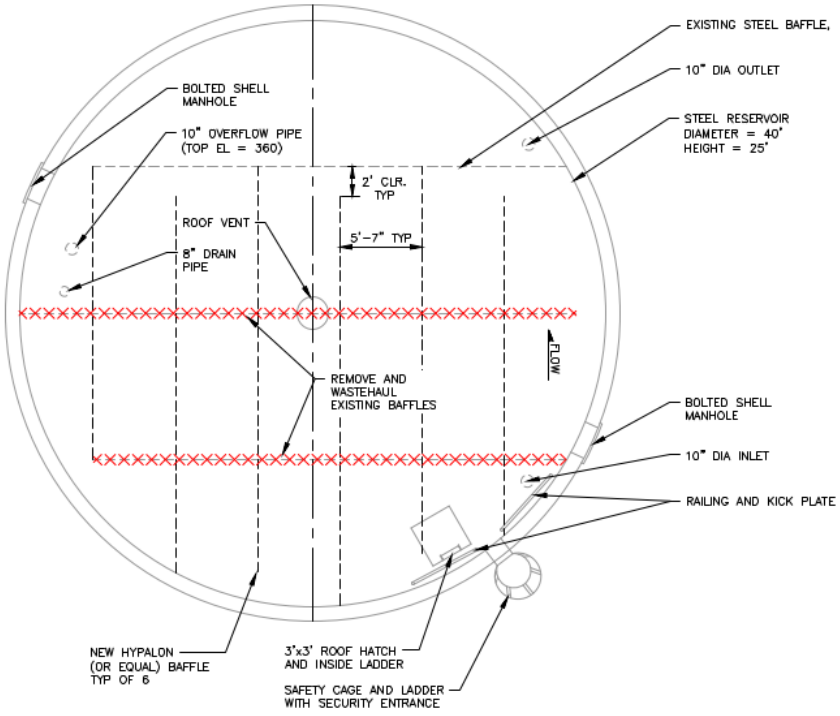
- Utilize existing CCB
  - Address coating system and other recommendations in Tech Memo #20434-2
  - Install additional baffles
  - Must provide temporary CT during modifications
    - Tankage
    - Piping
    - City of Bellingham service

Summary of Alternatives

Contact Time Alternative 1: Rehab Existing CCB



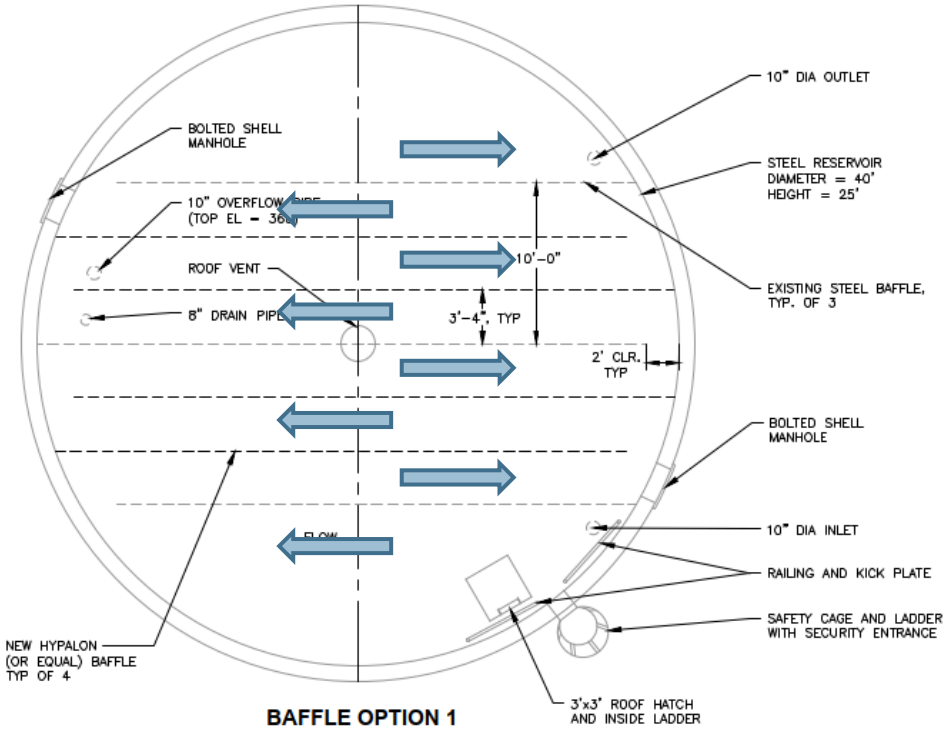
BAFFLE OPTION 1



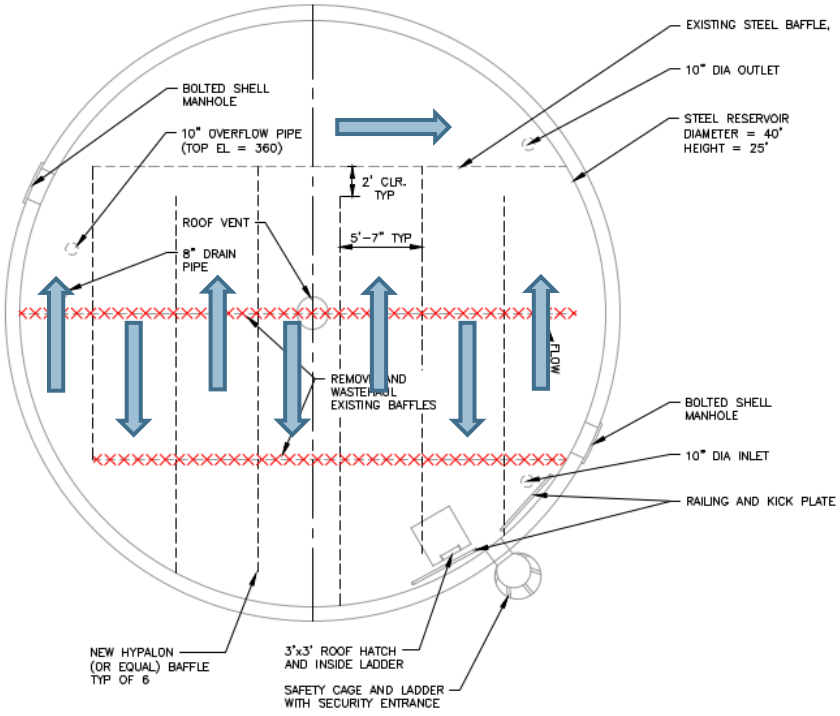
BAFFLE OPTION 2

Summary of Alternatives

Contact Time Alternative 1: Rehab Existing CCB



BAFFLE OPTION 1



BAFFLE OPTION 2

Summary of Alternatives

Contact Time Alternative 2: Replace Existing CCB

- Replace Existing CCB with new tank
  - 300,000 Gallons needed
    - Welded/bolted steel
    - Concrete
  - Geotechnical investigation & site considerations
  - Existing system can remain in service during construction

Summary of Alternatives

Contact Time Alternative 3: Supplement Existing CCB

- Construct new, smaller CCB
  - 100,000 Gallons needed
    - Concrete (Mt. Baker Silo)
  - Geotechnical investigation & site considerations
  - Existing system can remain in service during construction
  - Includes TM #20434-2 recommendations
    - Coating, hatches, welding, etc.

Alternative Comparison

Contact Time Cost, Benefits, & Drawbacks

No.	Description	Capital Cost* (2020)	Advantage	Disadvantage
1	Existing CCB	~$1,199,000	- Lowest cost	- No redundancy - Undersized for design flows - Must be rehabilitated - Temporary facilities required
2	New, replacement CCB	~$1,671,000	- Provides redundancy - Sufficient for design flows - No temporary facilities required	- New structure - Land and permits
3	New, supplemental CCB	~$1,794,000	- Sufficient for design flows - No temporary facilities required	- New structure - Land & permits - Includes TM2 recommendations

* Capital costs listed are for these alternatives only, and do not include recommendations or costs listed for other treatment system components. Total costs will be evaluated as part of the final Alternatives Analysis Report.

Alternative Comparison

Contact Time Goal Accomplishment

No.	Description	Cost	O&M Cost	G1	G2	G3	G4	G5	G6
1	Existing CCB	$$	$	X	N/A		N/A		X
2	Replacement CCB	$$$	$	X	N/A	X	N/A	X	X
3	Supplemental CCB	$$$	$	X	N/A		N/A	X	X

G1 - Maintain exceptional WQ performance record
G2 - Accommodate immediate need for additional space and separation of chemicals/electrical equipment
G3 - Provide adequate equipment and process redundancy
G4 - Improve access and flexibility for equipment repair/rehabilitation and/or future expansion
G5 - Provide capacity for full buildout flow (1,400 gpm)
G6 - Provide treatment equipment for 30-50 year time period

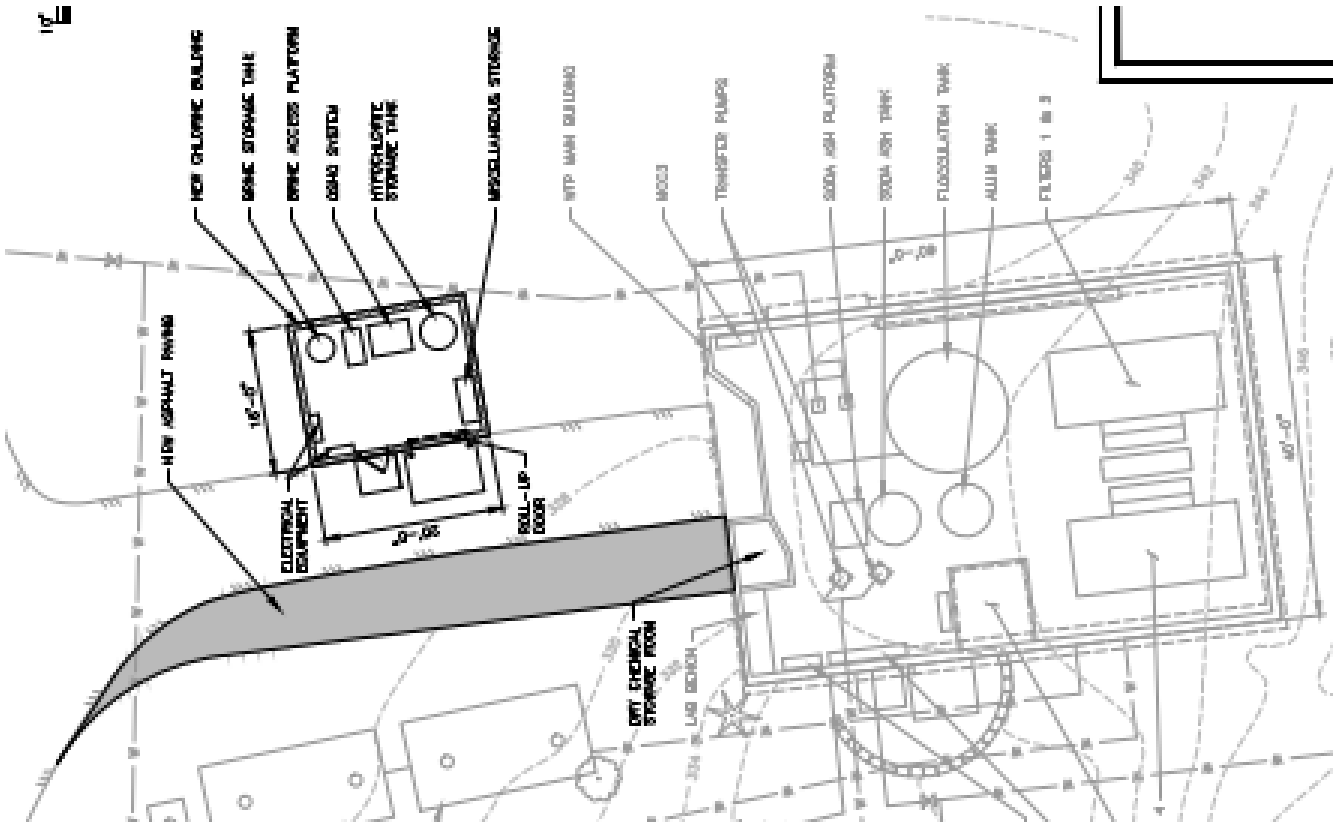
Next Steps

- Technical Memorandum 20434-7
  - Backwash System Analysis (Present on 2/24/2021)
- Technical Memorandum 20434-8
  - Struc/Arch System Analysis (Present on 2/24/2021)
- Risk Assessment
  - (March/April 2021)
- Final Alt. Analysis & Recommendations Report
  - (April/May/June 2021)

Questions?

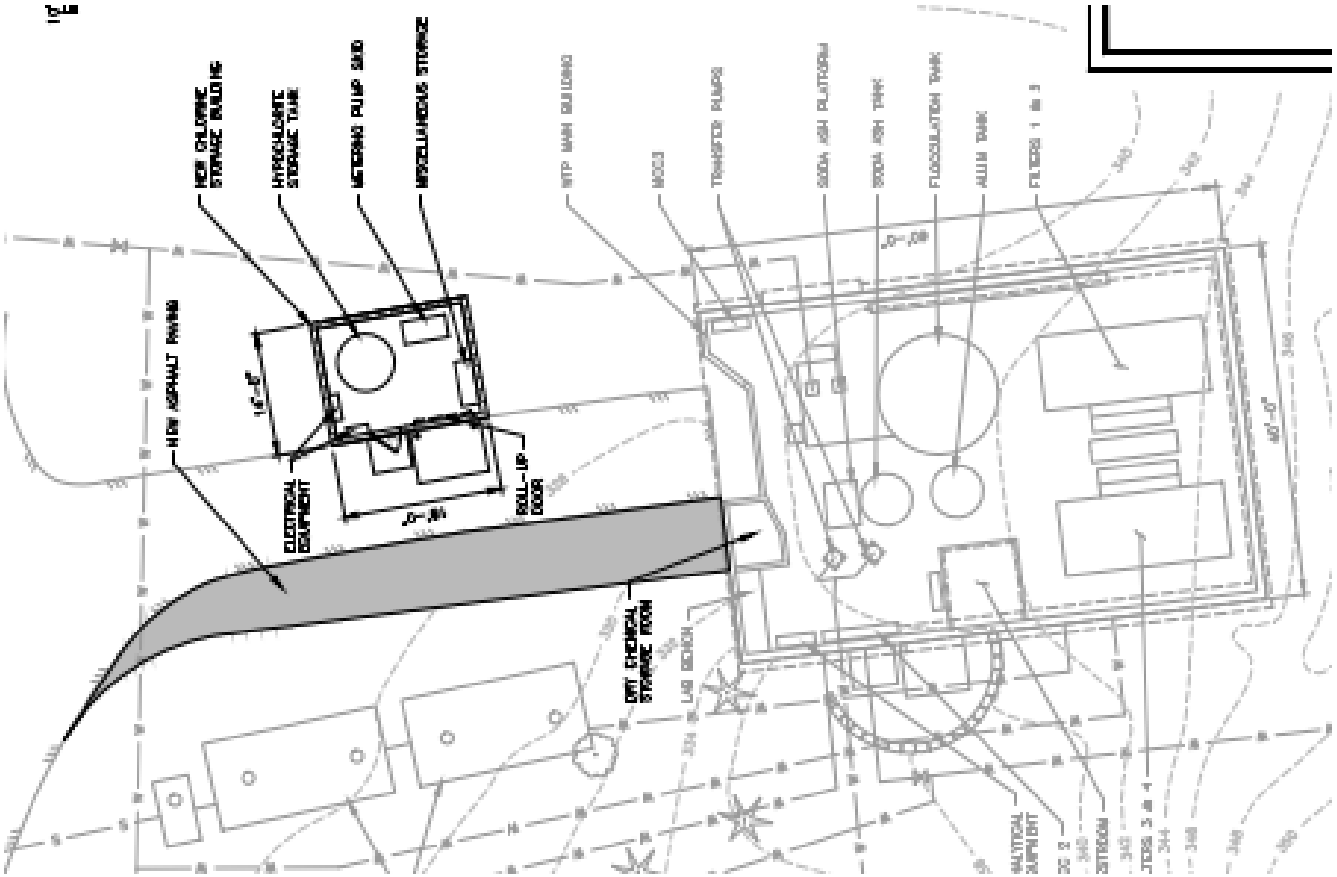
Supplementary Slides

Summary of Alternatives
Disinfection Alternative 2: OSHG



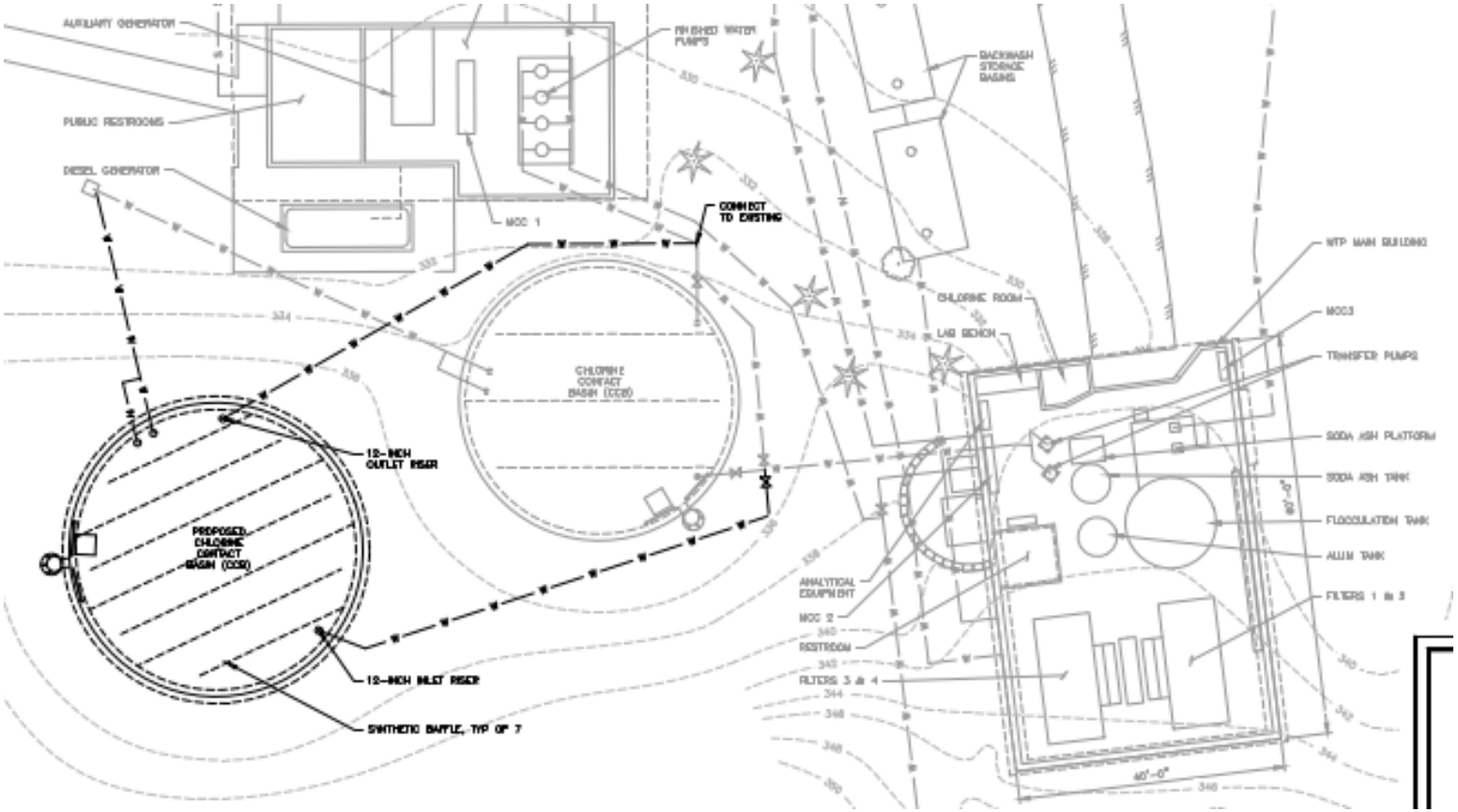
Summary of Alternatives

Disinfection Alternative 3: Bulk



Summary of Alternatives

Contact Alternative 2: New CCB



Summary of Alternatives

Contact Alternative 3: Supplement Existing CCB