



Monroe Avenue NE Infiltration Facility

A Presentation for the
2025 Fall APWA Conference

OCTOBER 15, 2025

CITY OF RENTON – JOE FARAH, KEVIN EVANS, JARED MCDONALD



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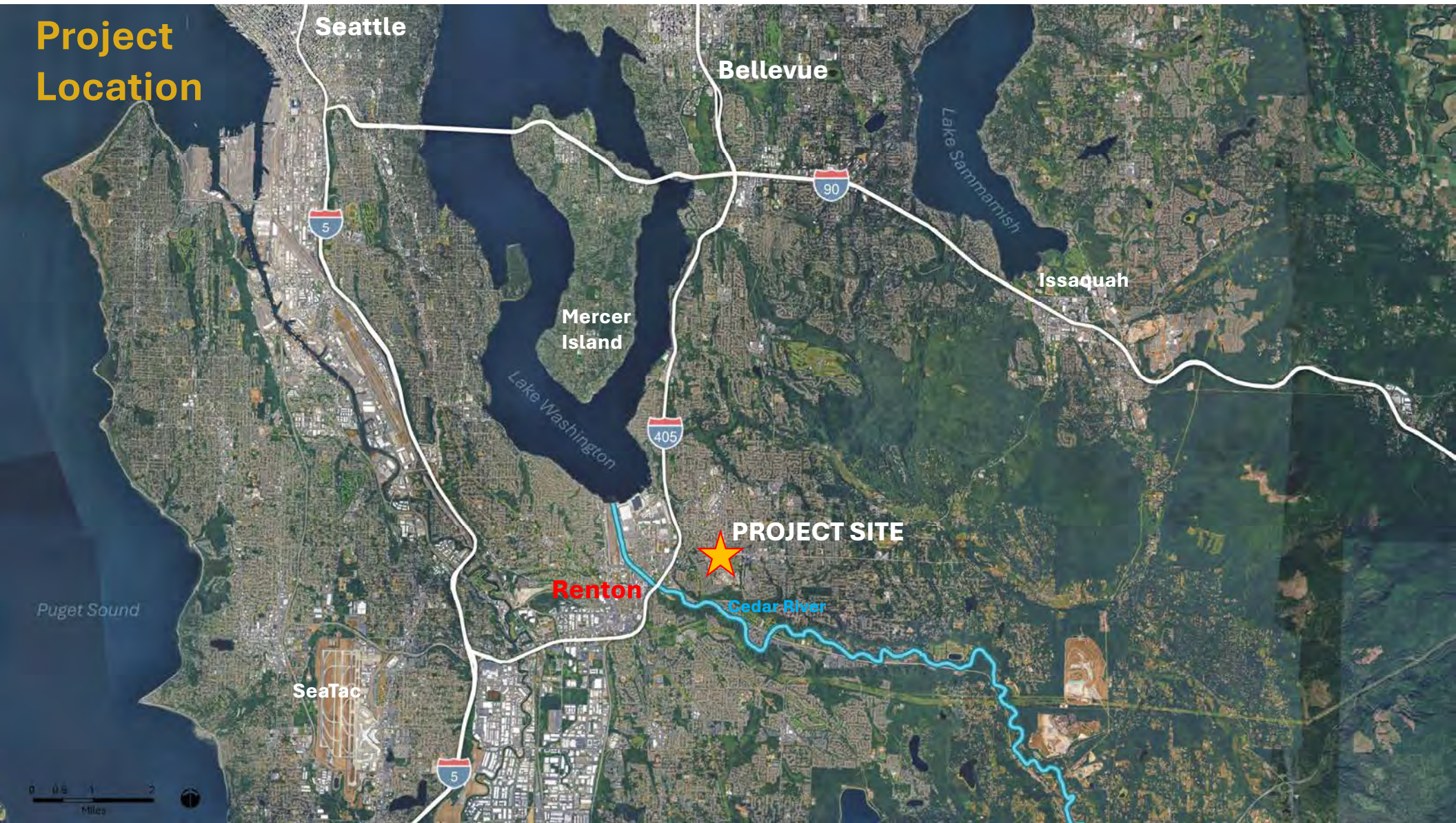


Project Background, Funding, and Delivery

Joe Farah

Surface Water Engineering Manager

Project Location



Project Background

Contributing Basin



**Offsite
Contributing
Basin Area:
246 acres**



Project Background

Project Site

- ▶ 14-acre Upper Balch Pit (project site) was used as a permitted sand and gravel pit from 1962 to 1982.
- ▶ The site has been used as an upland fill and reclamation site since 1982.
- ▶ The project site had a valid Special Fill and Grade permit issued in 2019.



Project Background

HISTORIC FLOODING



Project Background

Temporary Solution

- ▶ November 1996: Temporary drainage easement executed between City and Segale Properties, valid until pit filled
- ▶ 1997: 18-inch stormwater overflow pipe installed
- ▶ October 2007: 24-inch stormwater overflow pipe installed after November 2006 flooding
- ▶ Temporary drainage easement amended 4 times to add outfall and extend duration (2006, 2007, 2010, 2018)
- ▶ April 2019: Segale Properties applied to redevelop Upper Balch Pit which would remove two overflow pipes from operation
- ▶ A new approach was needed to managing stormwater runoff from the 246-acre subbasin



Project Approach

Infiltration Facility vs Trunkline

► Issues with Trunkline:

- Extensive trunkline length (4,000 to 7,300 linear feet of 48-inch pipe)
- Utility conflicts (Olympic Pipeline, telecom, sewer, water)
- Traffic conflicts (I-405, Maple Valley Hwy, NE 3rd/4th St)
- Property impacts (Cedar River Park, King County Emergency Center)
- Constructability (deep trench excavation, steep slopes, heavy vegetation)
- Permitting issues discharging to Cedar River

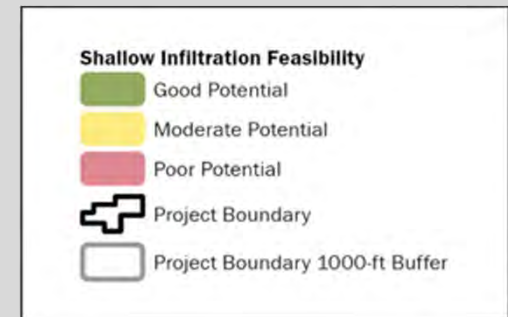
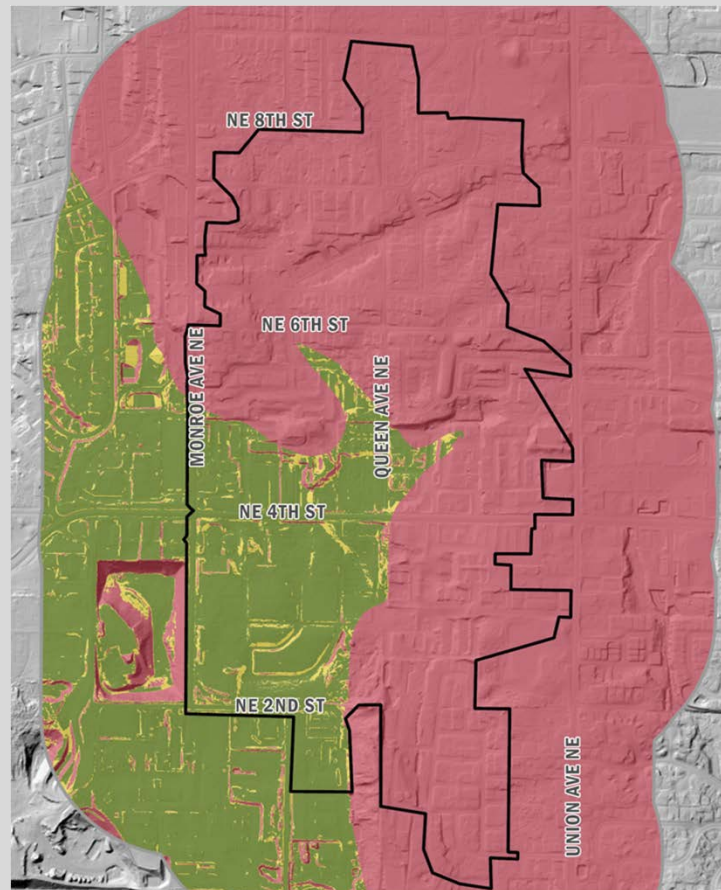
► Benefits of Infiltration Facility:

- Opportunity for grant funding, at comparable cost
- Reduced public impact
- Reduce flash flows to Cedar River
- Utilize high native infiltration rate
- Treat and cool stormwater for salmonid health
- Groundwater recharge



Project Approach

Infiltration Facility vs Trunkline



Project Approach

Infiltration Facility vs Trunkline

Infiltration vs Trunkline Options	Cost	Grant Eligibility	Flow Control Robustness	WQ to Cedar River	Construction Challenges	Public Impacts	Maintenance Required	Open Space/ Aesthetics	Total Rating
Infiltration Options									
Stormtech Infiltration Facility	\$11.5M	3	3	3	3	3	2	3	23
Gravel Infiltration Pit	\$13.8M	2	3	3	3	3	3	1	20
Infiltration Vault	\$23.3M	2	3	3	1	1	1	3	15
Trunkline Options									
Stormwater Trunkline to Cedar River via NE 4th Street	\$10.7M	1	2	2	1	1	3	2	15
Stormwater Trunkline to Cedar River via Route East of Pit	\$12.4M	1	2	2	1	1	3	2	14
Stormwater Trunkline to Cedar River via Route South of Pit	\$12.9M	1	2	2	1	1	3	2	14

Partnership with Segale Properties

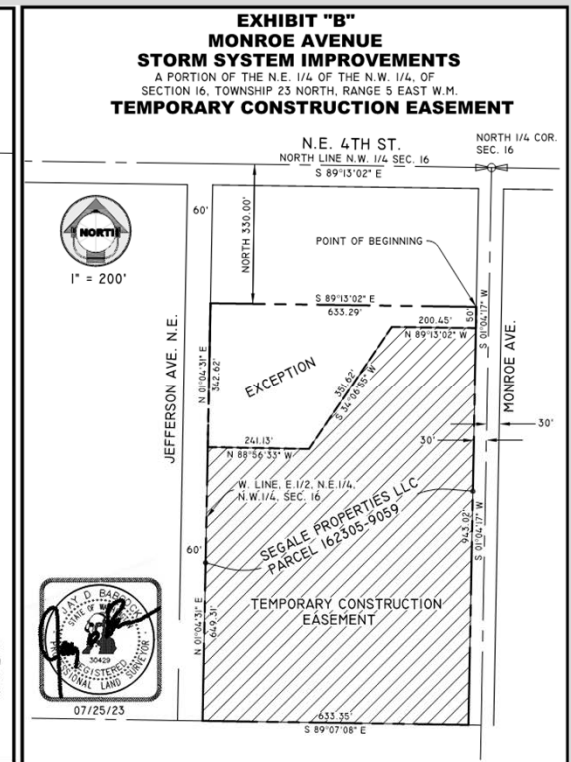
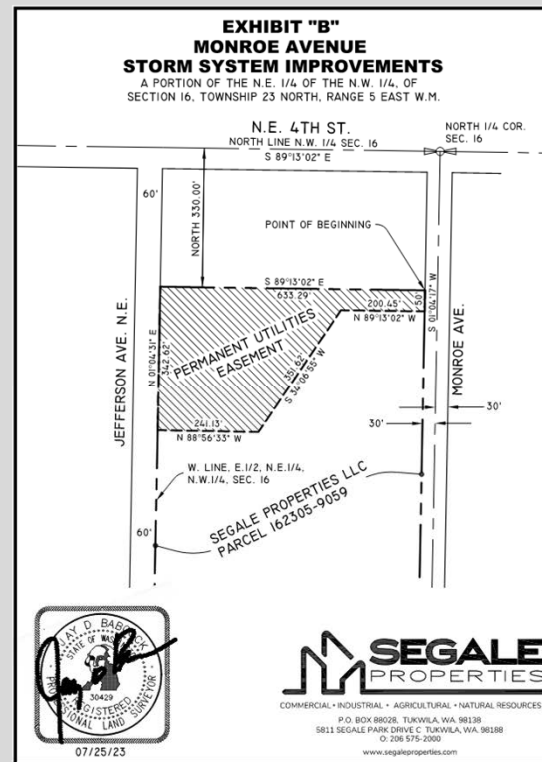
Key to initiating and delivering this project

- ▶ February 2020: Initial contact to explore infiltration facility option
- ▶ December 2020: Easement negotiations began and evolved with project design
- ▶ October 2023: Renton and Segale executed a purchase and sale agreement for easements
- ▶ Building trust
- ▶ Fostering engagement
- ▶ Leveraging expertise with site



Easement Acquisition & Agreement Terms

- ▶ Purchase and sale agreement includes temporary construction easement and permanent utility easement
- ▶ \$4,336,732 total cost of agreement
- ▶ Remediation work: Removal of non-native fill down to native soil (infiltration plane). Critical to avoid during wet season.
- ▶ Open grass play field for recreation
- ▶ Future development connection to stormwater facilities for flow control and water quality treatment
- ▶ Aesthetic considerations
- ▶ Mutual benefits



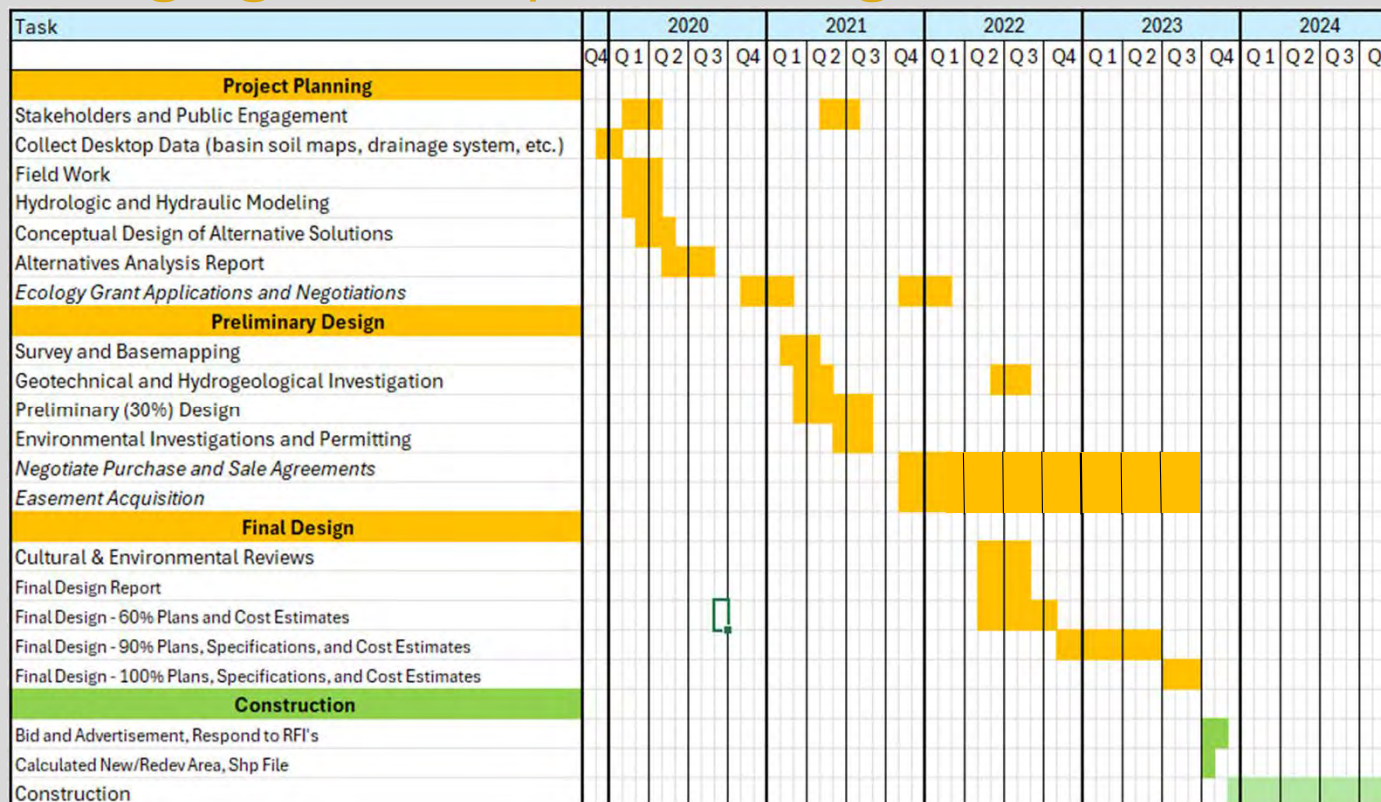
Project Funding

- ▶ Total expenditures between 2019 and 2025: \$19,865,588
 - City project management
 - Professional Services
 - Construction Services
 - Purchase and Sale Agreement
- ▶ Funding from City: \$8,539,314
- ▶ Funding from King County Flood Control District for the pre-design planning phase: \$479,072
 - 2019 Flood Reduction Grant: \$200,000
 - 2020 Flood Reduction Grant: \$100,000
 - 2021 Sub-Regional Opportunity Fund: \$179,072
- ▶ Funding from Washington State Department of Ecology Stormwater Financial Assistance Program (SFAP) for design and construction: \$10,847,202



Project Sequencing

Bringing All Components Together for Successful Delivery



- ▶ Finding the most optimal solution
- ▶ Funding/grants
- ▶ Purchase and sale agreements
- ▶ Design paralleling easement acquisition
- ▶ Construction

Orange = Project Coordination/Design, Green = Construction Activities

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Project Design

Kevin Evans

Surface Water Engineer

Project Manager - Design

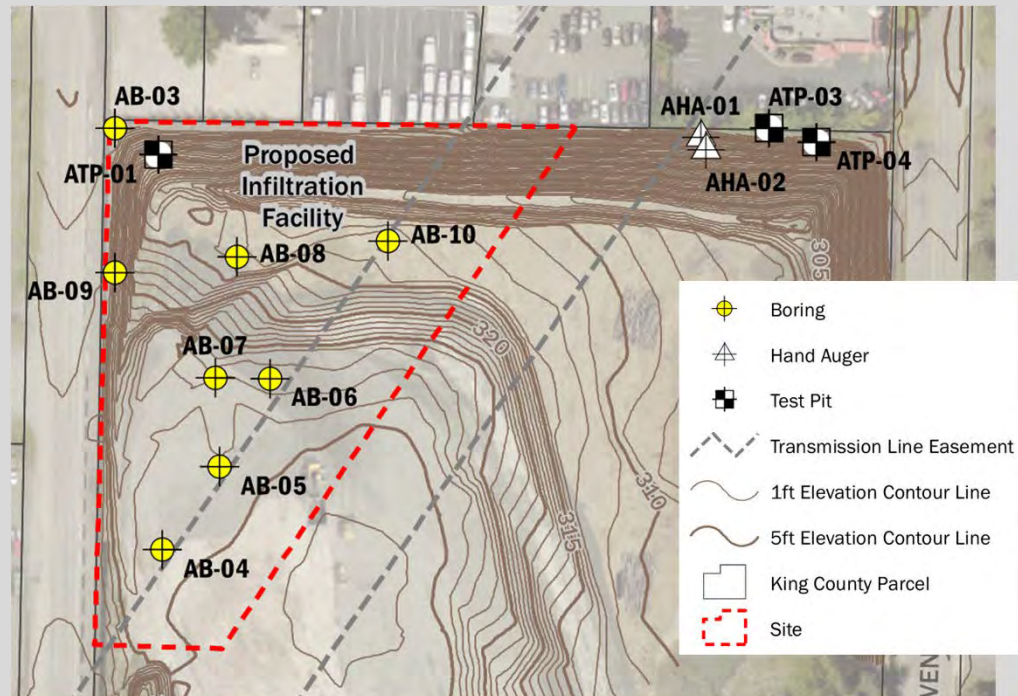
Design Constraints and Parameters

- ▶ Long-term Performance
- ▶ Facility Redundancy
- ▶ Flood/Flow Control Targets
- ▶ Water Quality Targets
- ▶ Facility Size/Layout
- ▶ Construction Cost
- ▶ Ease/Cost of Maintenance
- ▶ Geotechnical Characteristics



Geotechnical Explorations

- ▶ Site had existing steep slope hazard areas associated with sand and gravel mining
- ▶ Soils found at the site included topsoil, fill, glacial outwash, and till
- ▶ Infiltration testing showed high infiltration capacity at the site
 - Measure up to 198 inches per hour
 - Design at conservative 20 inches per hour
- ▶ Sediment loading concerns



Exploration ID	ATP-01	AB-04	AB-09
Measured Infiltration Rate (in/hr)	140	198	61
Average Design Infiltration Rate (in/hr)	30		
Max. Design Rate allowed by Renton (in/hr)	20		

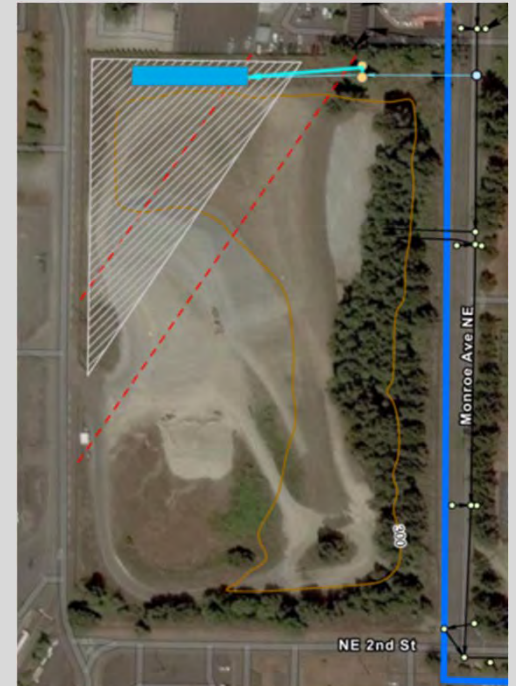
Alternatives Analysis

Flow Control Options Considered

1. Stormtech Chamber Infiltration Facility
 2. Gravel Infiltration Pit
 3. Infiltration Vault
- ▶ All options in series with an upstream hydrodynamic separator, flow splitter, and water quality treatment facility.

Water Quality Treatment Options Considered:

1. Treatment Field
2. Treatment Vault with Biofiltration Media



Alternatives Analysis

Flow Control Alternative 1: Stormtech Chamber Infiltration Facility

- ▶ Use of ADS Stormtech Chamber gallery to provide stormwater storage for infiltration into gravel
- ▶ Isolator rows used to catch sediment can be easily vactored out from surface
- ▶ Least expensive flow control option
- ▶ Easiest alternative to perform operations and maintenance (O&M)



Alternatives Analysis

Flow Control Alternative 2: Gravel Infiltration Pit

- ▶ Concrete sand filtration vault followed by 24' deep gravel infiltration pit
- ▶ High risk of clogging sand filter and infiltration gravel
- ▶ 2nd highest construction cost alternative
- ▶ Could have significant O&M cost to excavate and restore gravel to clean condition



Boeing Creek Park Stormwater Detention/Infiltration Pond, City of Shoreline

Alternatives Analysis

Flow Control Alternative 3: Infiltration Vault

- ▶ Stormwater would infiltrate through a sand liner before entering concrete infiltration vault
- ▶ High risk of fouling infiltration gravel
- ▶ Construction cost of alternative is easily the highest
- ▶ Difficulty to perform maintenance would lead to high O&M costs

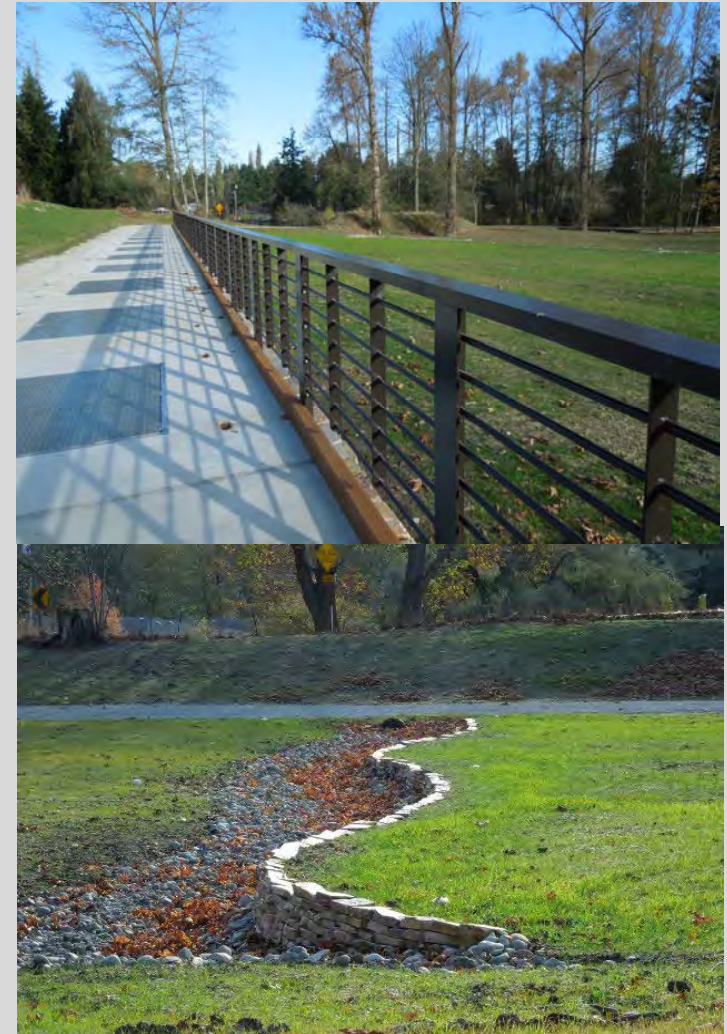


Stormwater Vault at Overlake Village in Redmond 

Alternatives Analysis

Water Quality Treatment Alternative 1: Treatment Field

- ▶ Sediment collection via concrete trough before sheet flow over vegetated slope with amended soil
- ▶ Large footprint, more expensive construction costs
- ▶ Basic water quality treatment



Alternatives Analysis

Water Quality Treatment Alternative 2: Treatment Vault with Biofiltration Media

- ▶ High volume flow treatment high pollutant removal for developed sites
- ▶ High permeability proprietary media w/underdrain
- ▶ Enhanced (metals) water quality treatment

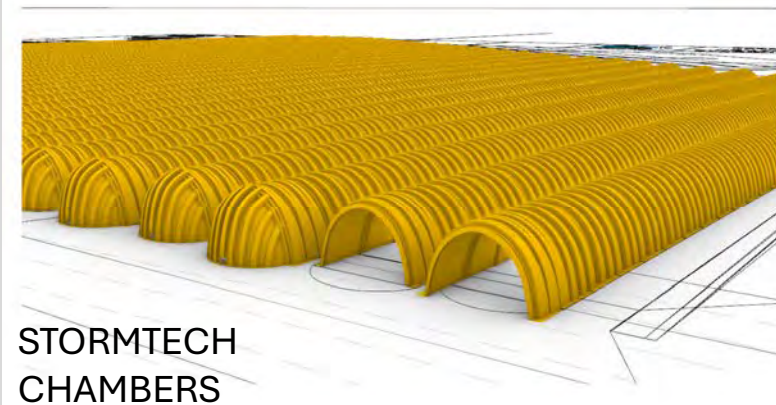


Alternatives Analysis

Selected Alternatives

Flow Control Alternative Selected:

- ▶ FC Alt. 1 - Stormtech Chamber Infiltration Facility
 - Lowest construction cost
 - Easiest to maintain

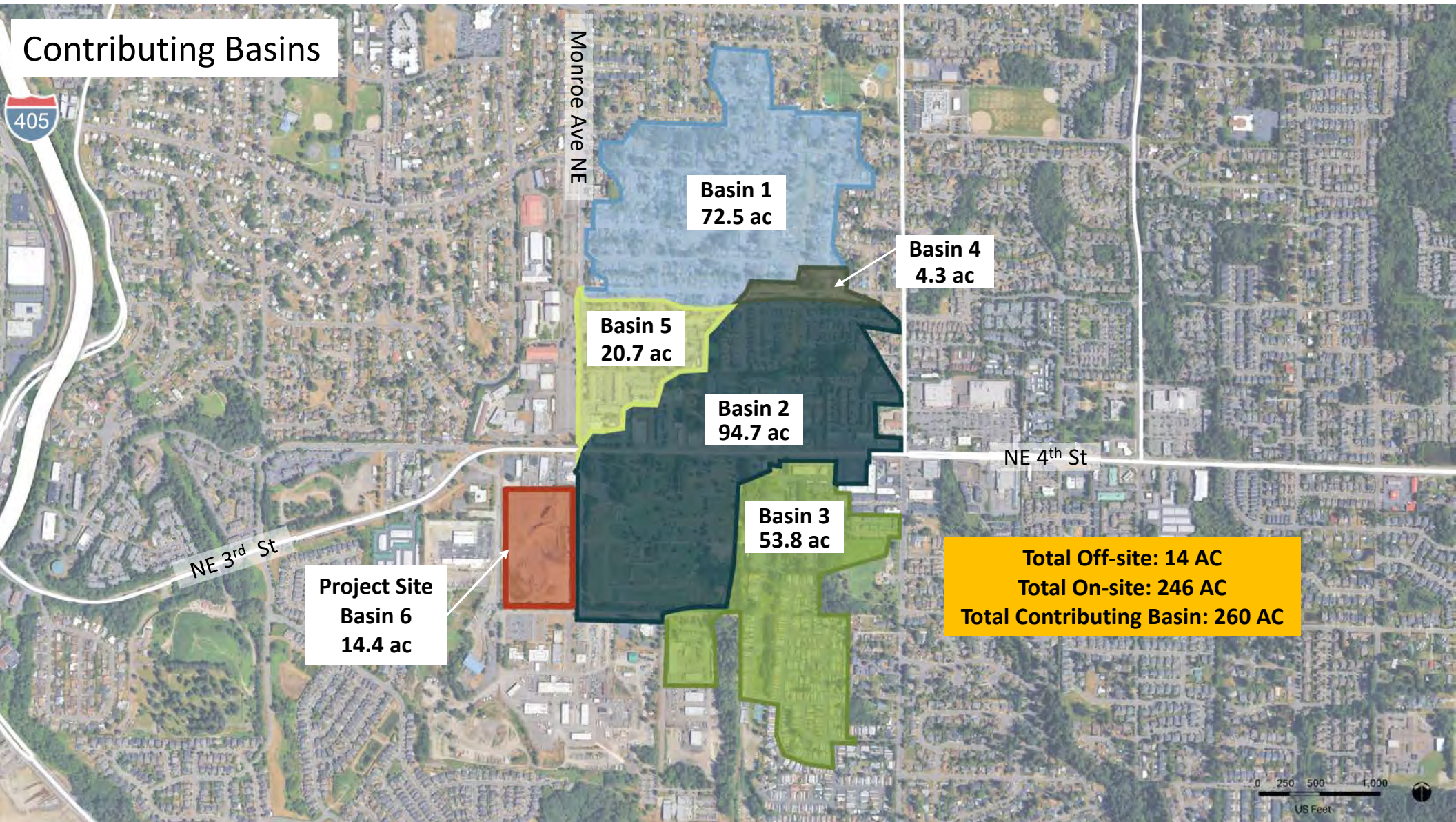


Water Quality Treatment Alternative Selected:

- ▶ WQ Alt. 2 - Treatment Vault with Proprietary Biofiltration Media (Boxless BioPod StormMix Media)
 - Lower construction cost
 - Greater water quality benefit
 - Smaller facility footprint



Contributing Basins



Hydrologic and Hydraulic Modeling

Runoff Calculation

	DRAINAGE BASINS					
	1	2	3	4	5	6
Lawn Area (AC)	41.63	52.18	13.47	2.13	9.21	8.66
Impervious Area (AC)	30.83	42.53	40.32	2.13	11.47	5.78
Total Area (AC):	72.46	94.71	53.79	4.26	20.68	14.44

- ▶ Assumed existing conditions for Basins 1-5 and future conditions for Basin 6

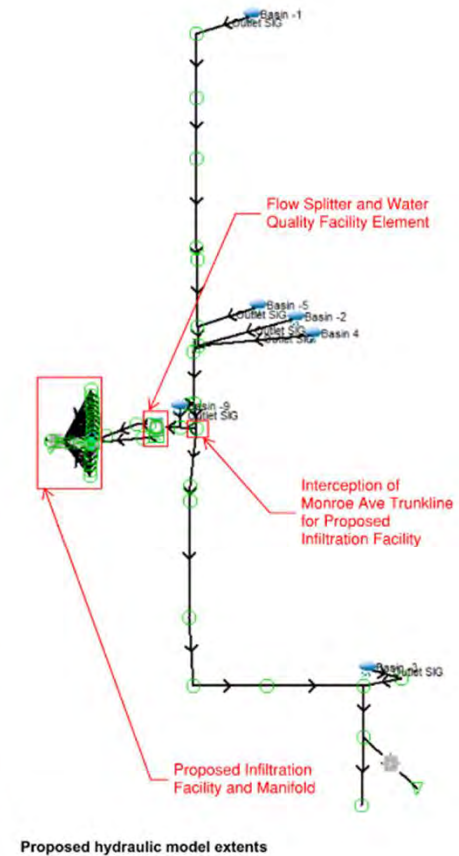
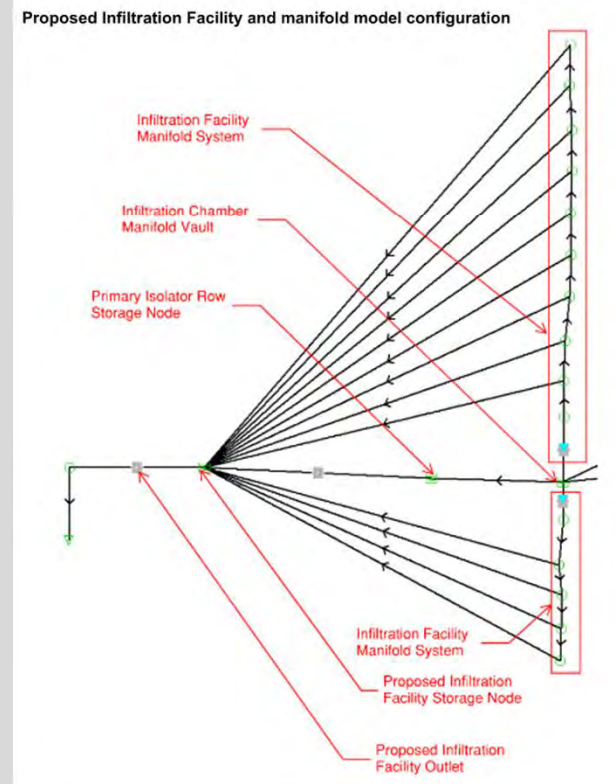
Peak Discharge Rates (CFS)	DRAINAGE BASINS						TOTAL BASIN ²
	1	2	3	4	5	6 ¹	
2-Year	13.08	19.16	17.28	0.91	5.30	2.81	52.47
5-Year	17.09	25.16	22.18	1.18	6.97	3.83	69.52
10-Year	20.01	29.46	25.62	1.36	8.15	4.57	81.79
25-Year	23.99	35.26	30.20	1.61	9.75	5.57	98.44
50-Year	27.18	39.86	33.78	1.81	11.01	6.38	111.70
100-Year	30.58	44.70	37.51	2.02	12.35	7.22	125.73

- ▶ WQ Design Flow Rate: 12.6 cfs
- 91% runoff volume
 - Approx. 6-month storm

Hydrologic and Hydraulic Modeling

WWHM-SWMM Modeling

- ▶ Allows for analysis of scaled hydrographs and modeling full historic runoff through proposed facility.
- ▶ Hydraulic analysis of project features (vaults, flow splitter, infiltration, etc.)
- ▶ Results
 - Flow control facility to infiltrate all stormwater from 100-yr peak flow event.
 - Water quality treatment facility to treat up to water quality design flow rate (approx. 6-month storm).

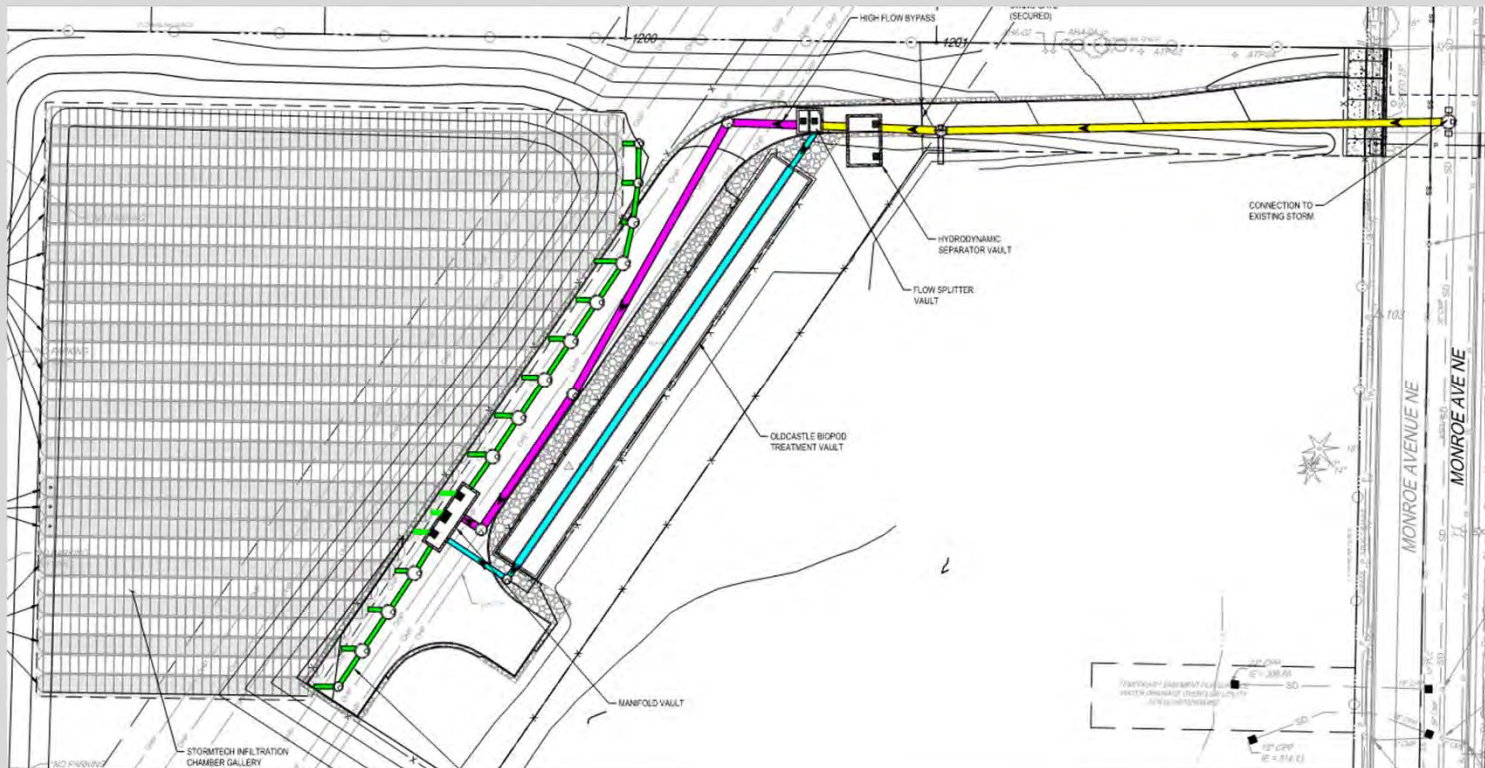


Original Facility Concept



Design Evolution and Refinements

Facility Overview



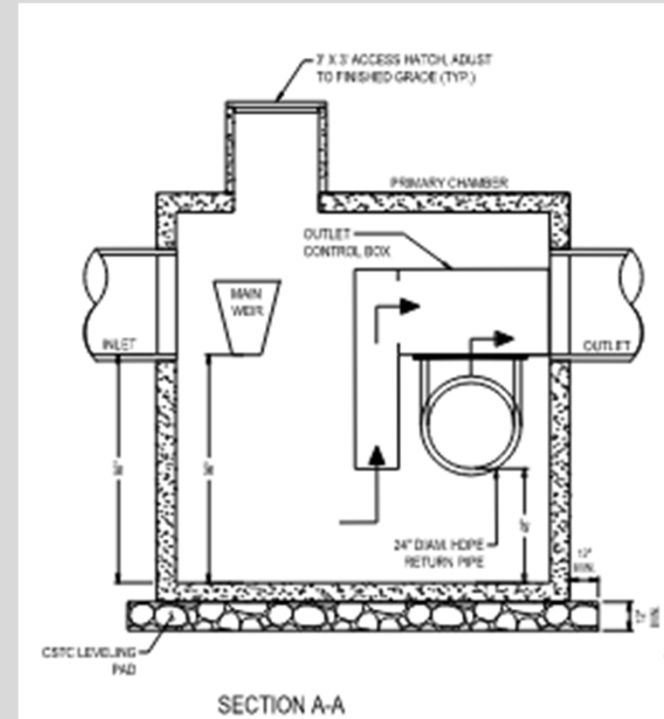
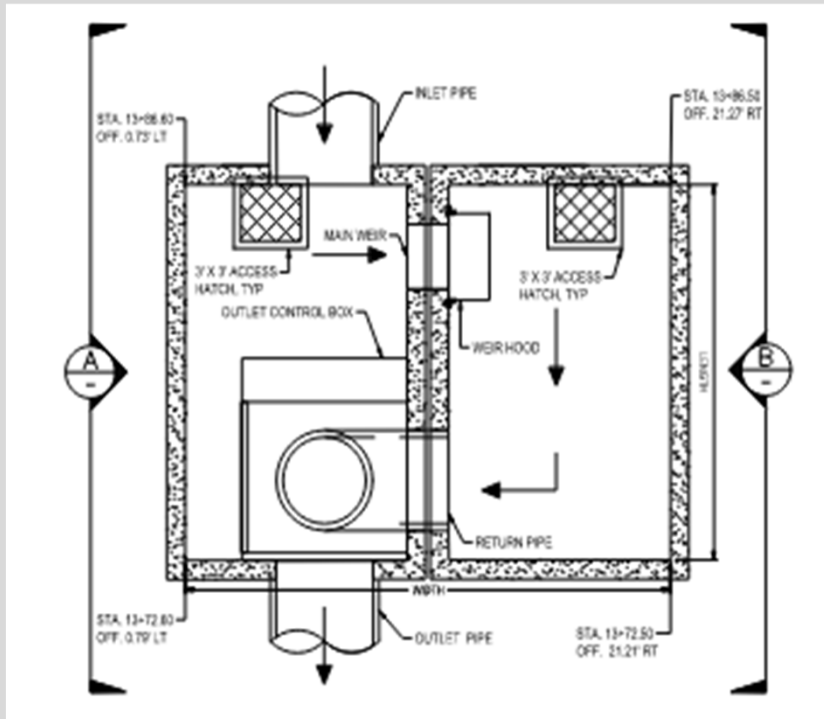
LEGEND

	INFLOW TO FACILITY
	HIGHFLOW BYPASS
	TREATED RUNOFF
	MANIFOLD DISTRIBUTION SYSTEM

Design Evolution and Refinements

Hydrodynamic Separator

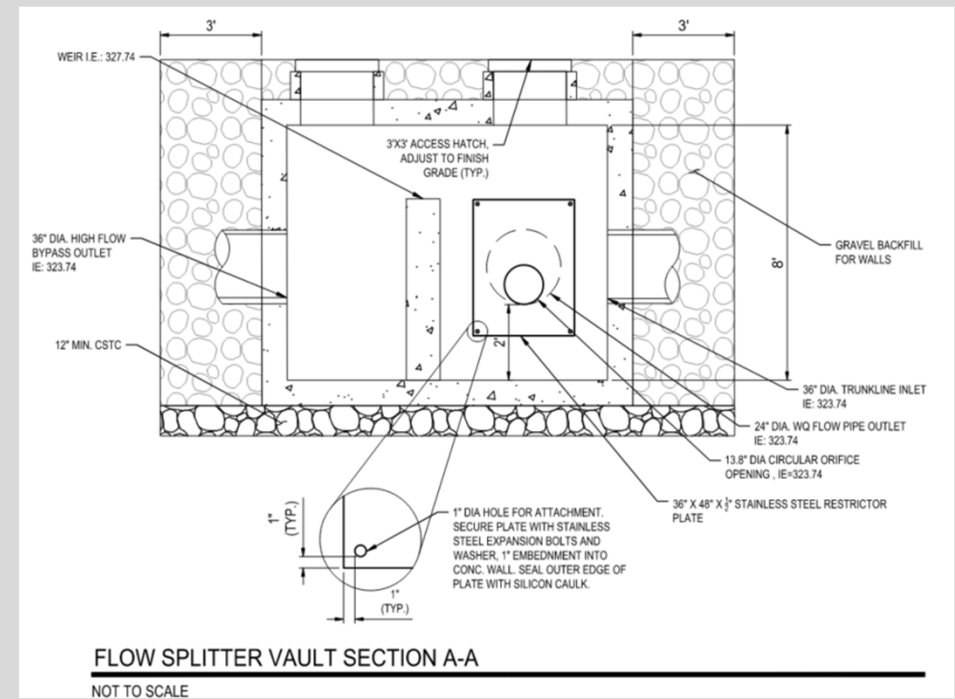
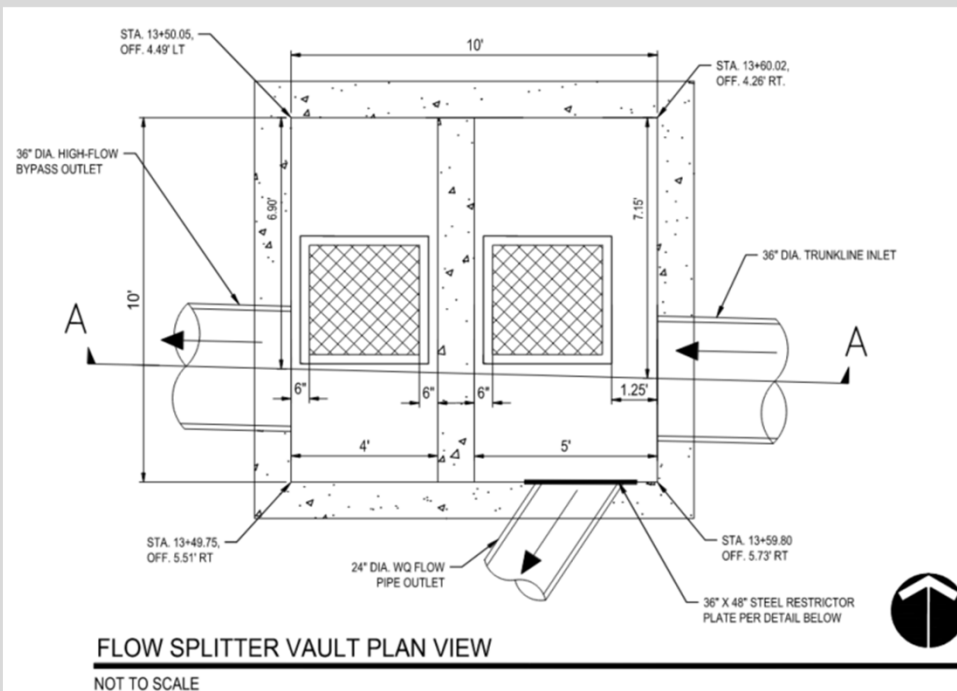
- ▶ Pre-treatment: sediment removal prior to entering facilities



Design Evolution and Refinements

Flow Splitter

- Splits flow between water quality treatment and high flow bypass paths



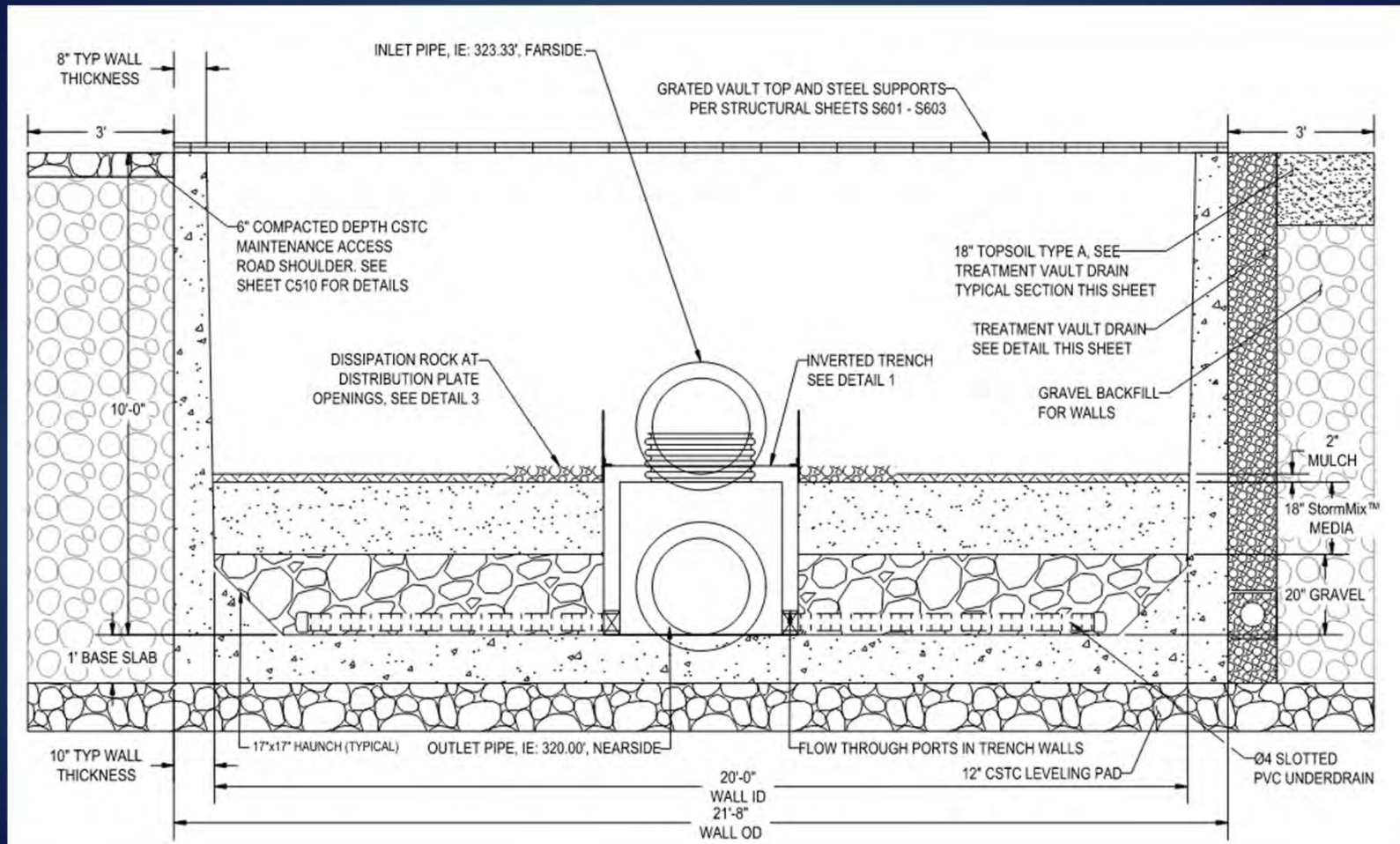
Design Evolution and Refinements

Treatment Vault with Proprietary Media

- ▶ General Use Level Designation (GULD) approved by DOE
- ▶ Provides enhanced (metals) water quality treatment
 - ▶ TSS, dissolved zinc, dissolved copper, total phosphorus
- ▶ Treats water quality flow rate from contributing basin (12.6 cfs), equivalent to 91% of total runoff volume



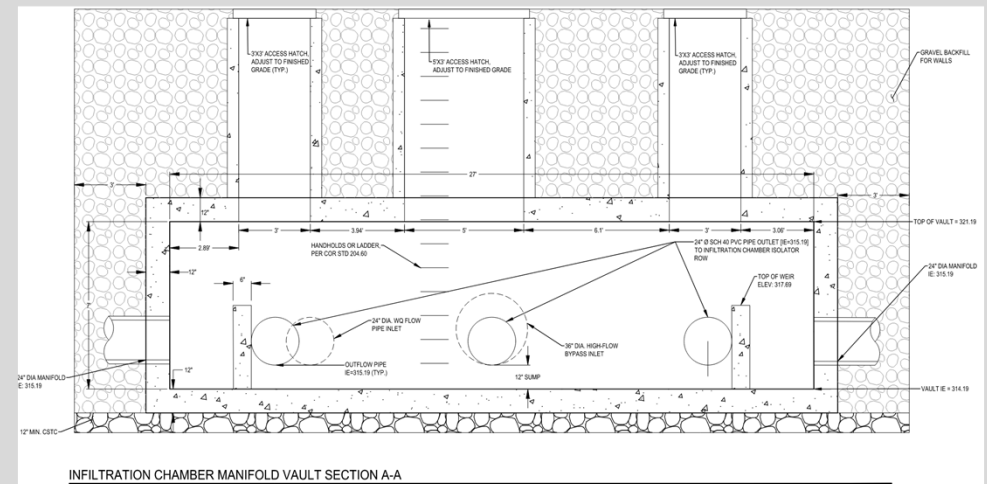
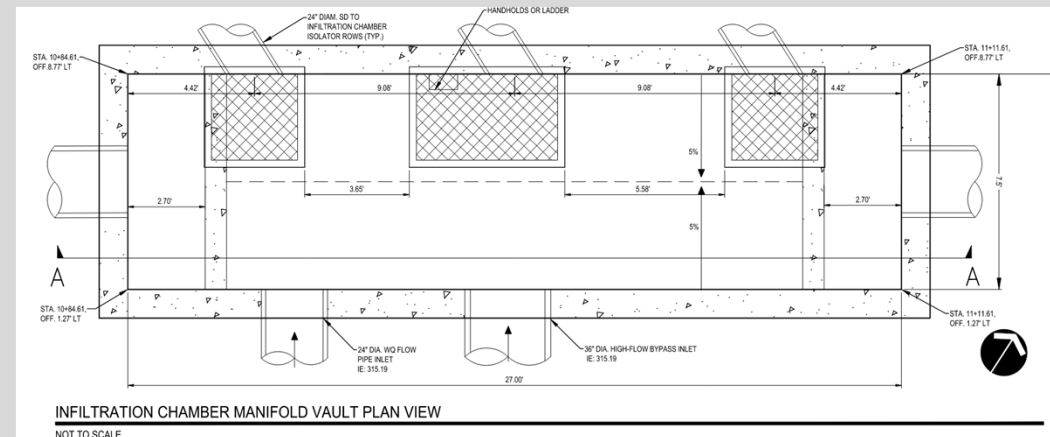
TREATMENT VAULT CROSS SECTION



Design Evolution and Refinements

Manifold Distribution Vault

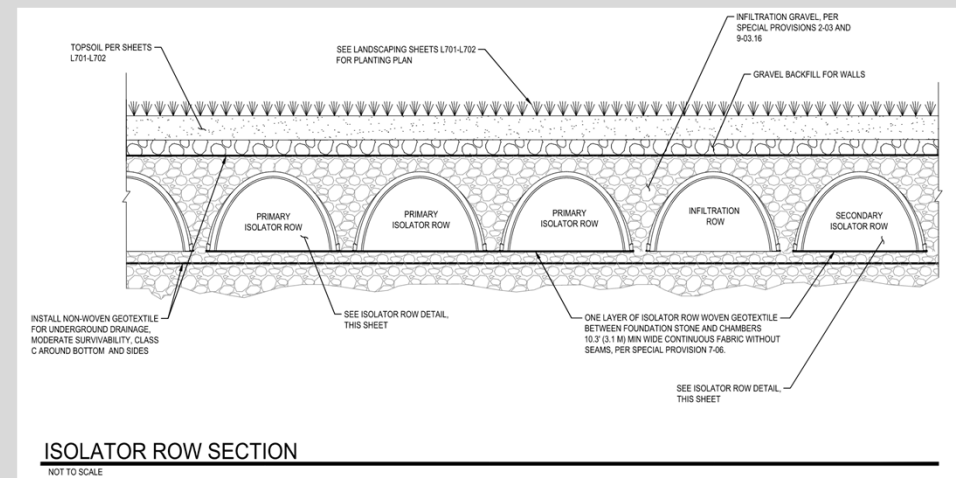
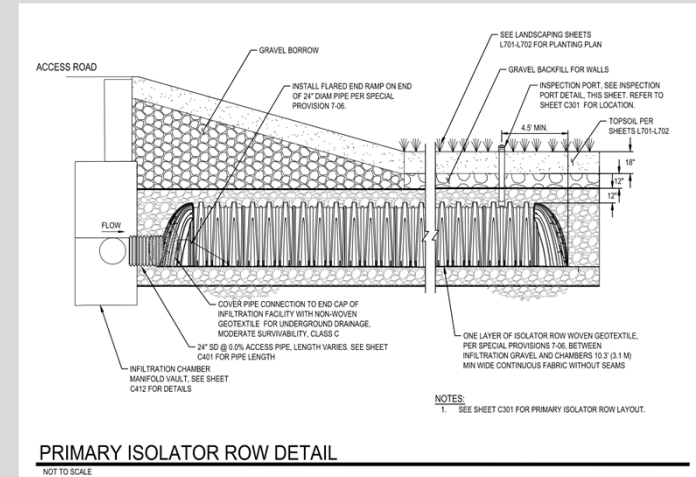
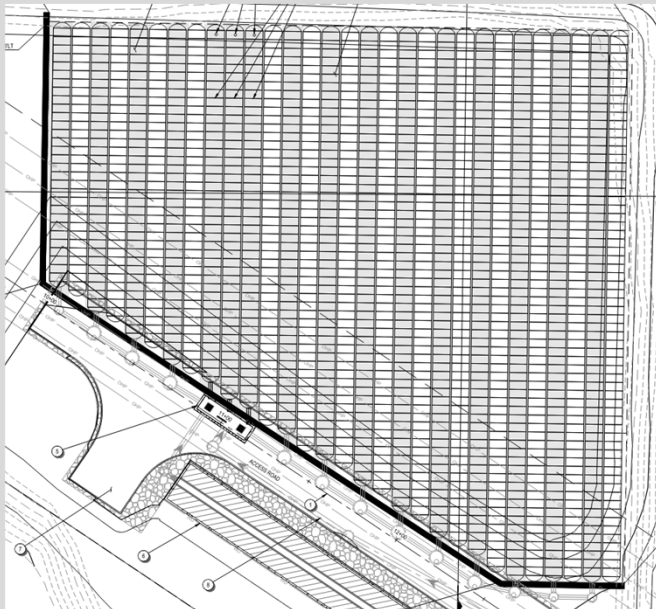
- ▶ Direct stormwater to primary isolator rows
- ▶ At high flows, engage secondary isolator rows
- ▶ Easy access for maintenance



Design Evolution and Refinements

Stormtech Chamber Infiltration Gallery

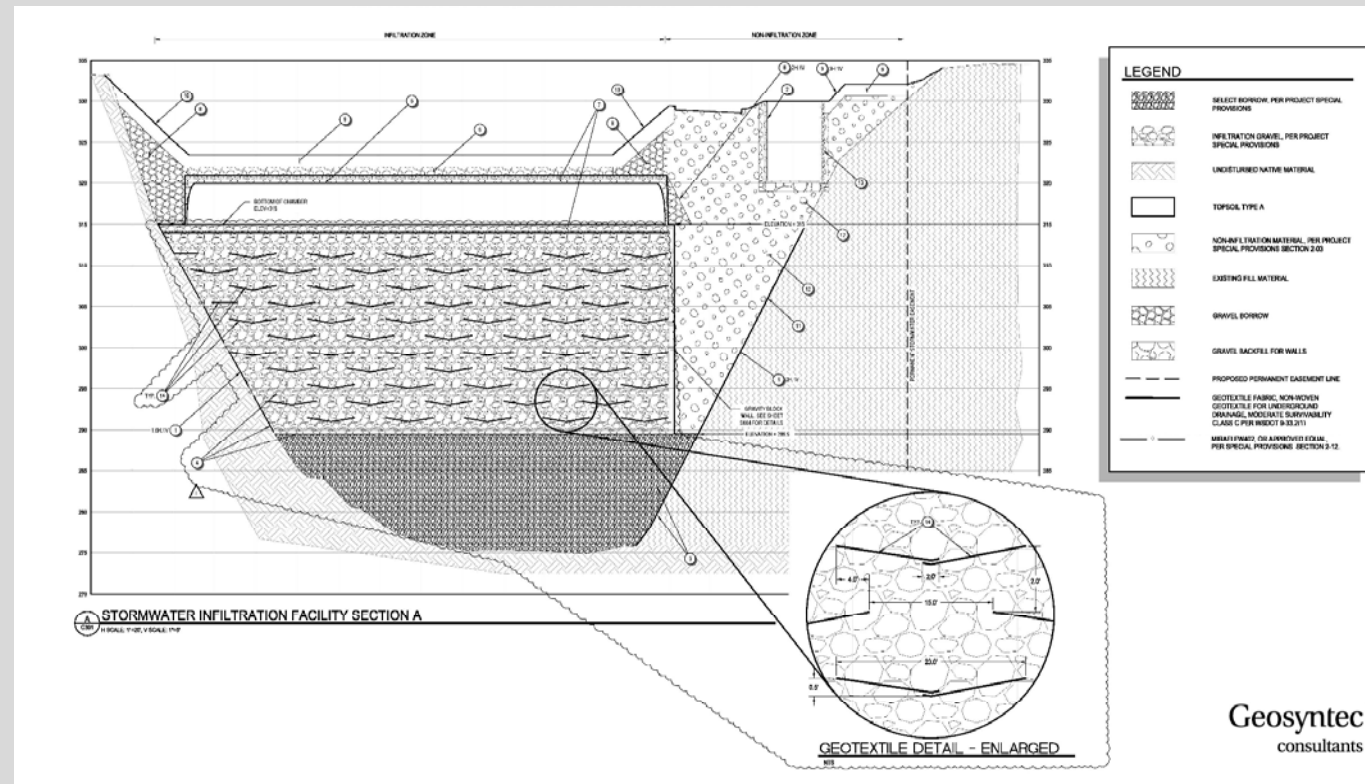
- ▶ Isolator rows (Primary and Secondary)
- ▶ Geotextile to facilitate cleaning of isolator rows
- ▶ Infiltration rows to engage from below

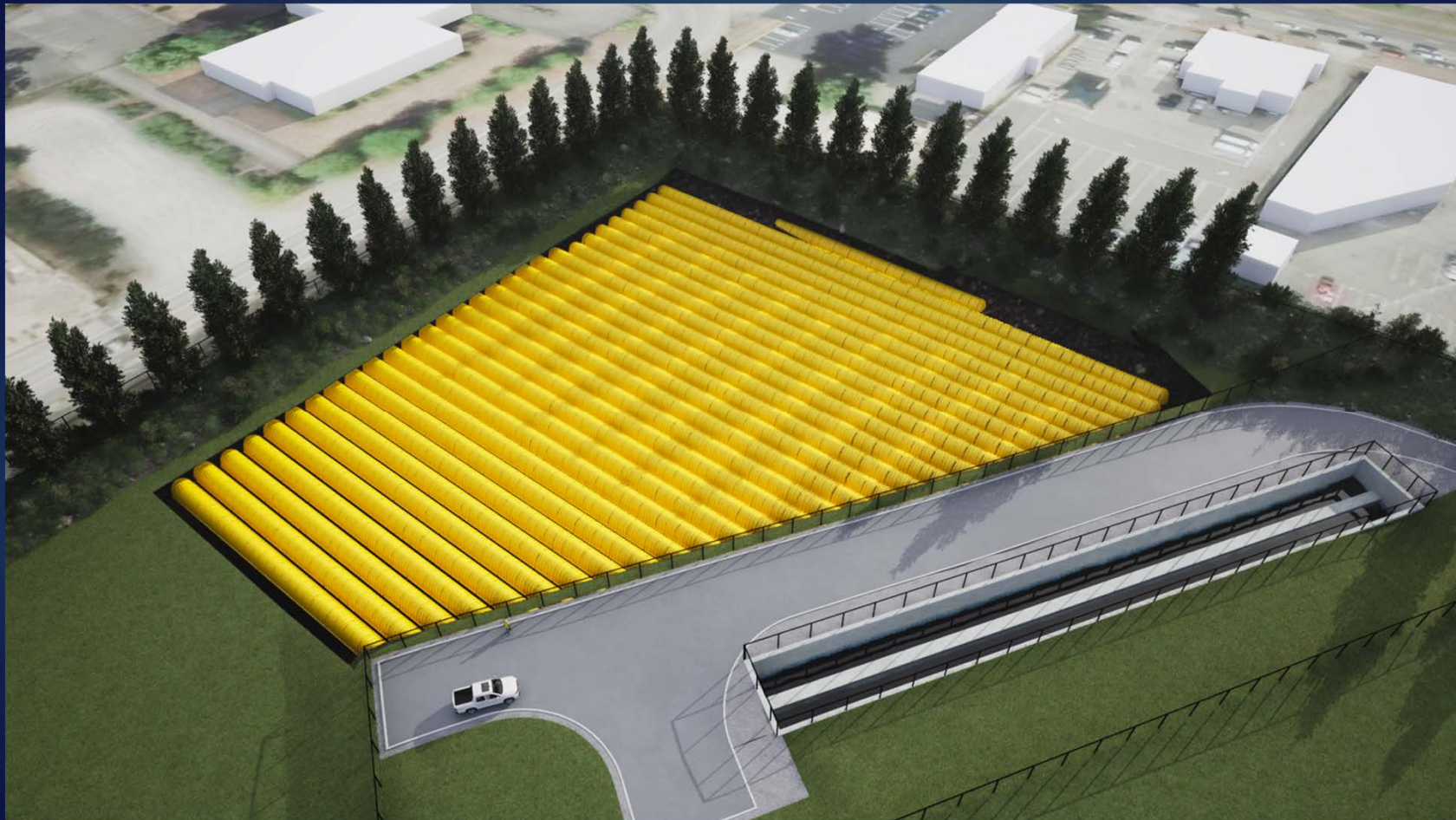


Design Evolution and Refinements

Infiltration and Non-Infiltration Fill Material Selection

- ▶ ASHTO #3 infiltration gravel (2% fines) required innovative geotextile detail
- ▶ Select borrow to mimic permeability of native soils (<5% fines, no organics)
- ▶ Geotextile troughs to prevent fouling of infiltration plane
- ▶ Gravity block wall to keep construction water from fouling infiltration facility





Design Evolution and Refinements

Access and Maintenance

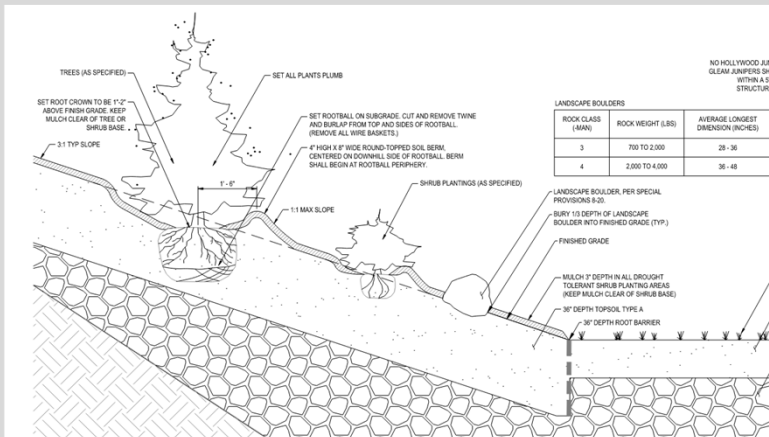
- ▶ Hammerhead access road allows for vector truck turnaround
- ▶ O&M Manual provided to the City of Renton Maintenance staff
- ▶ Sediment monitoring and management key for effective functioning through design lifespan



Design Evolution and Refinements

Site Restoration

- ▶ Play field seed mix for grassy area
- ▶ California Incense Cedar and Black Poplar
- ▶ Drought tolerant shrub plantings
- ▶ Landscape boulders



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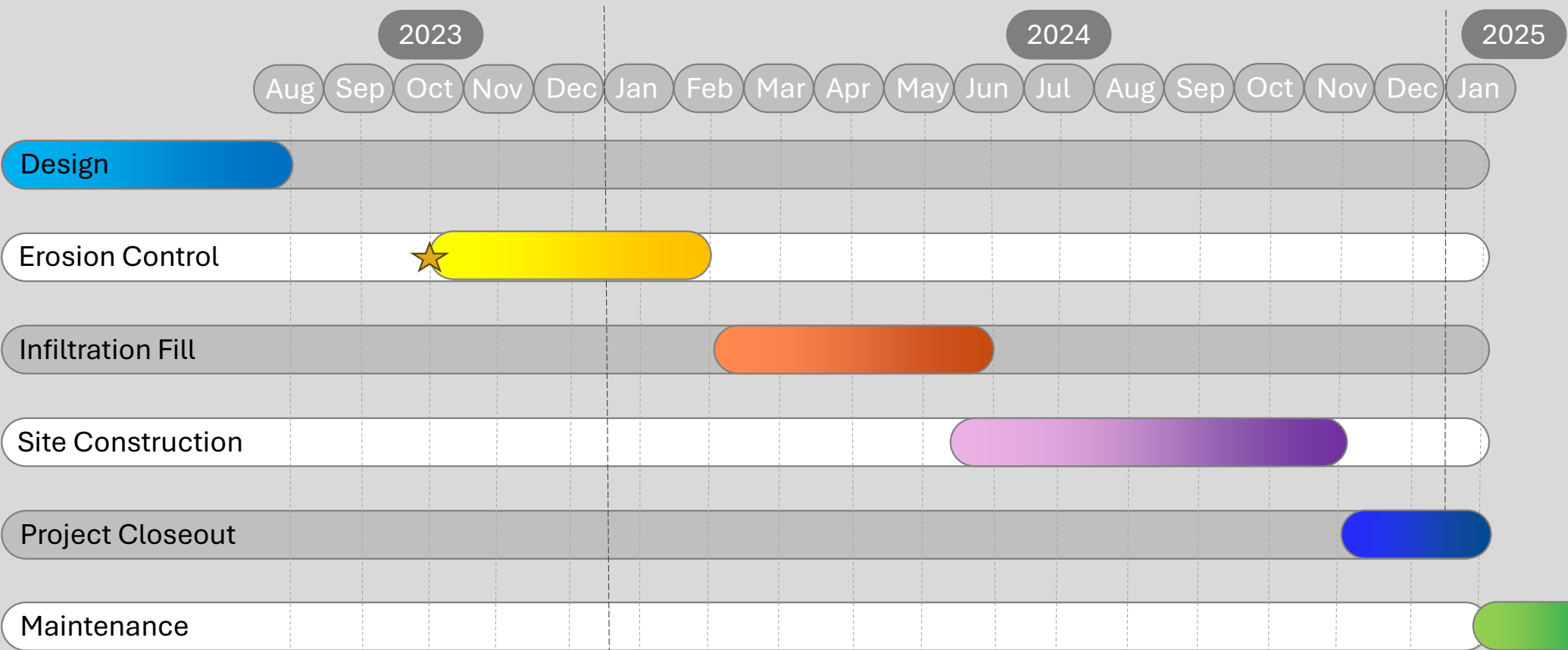


Project Construction

Jared McDonald

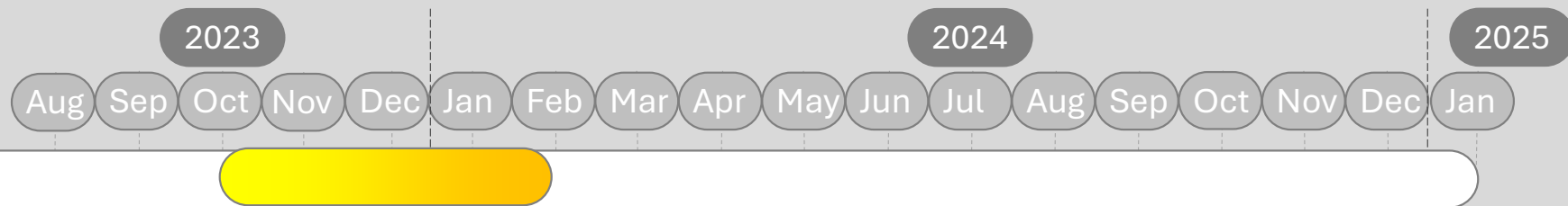
Principal Surface Water Engineer
Project Manager - Construction

Construction Timeline



★ City of Renton gained control of site for private property owner

Erosion Control



- ▶ Private property owner handed the site with fill removed per purchase and sale agreement
- ▶ Excavation of existing fill would not be feasible over the wet season.
- ▶ Need to protect infiltrative soil
- ▶ Small Works Roster - Erosion Control Contract
 - ▶ FTS Excavation, LLC

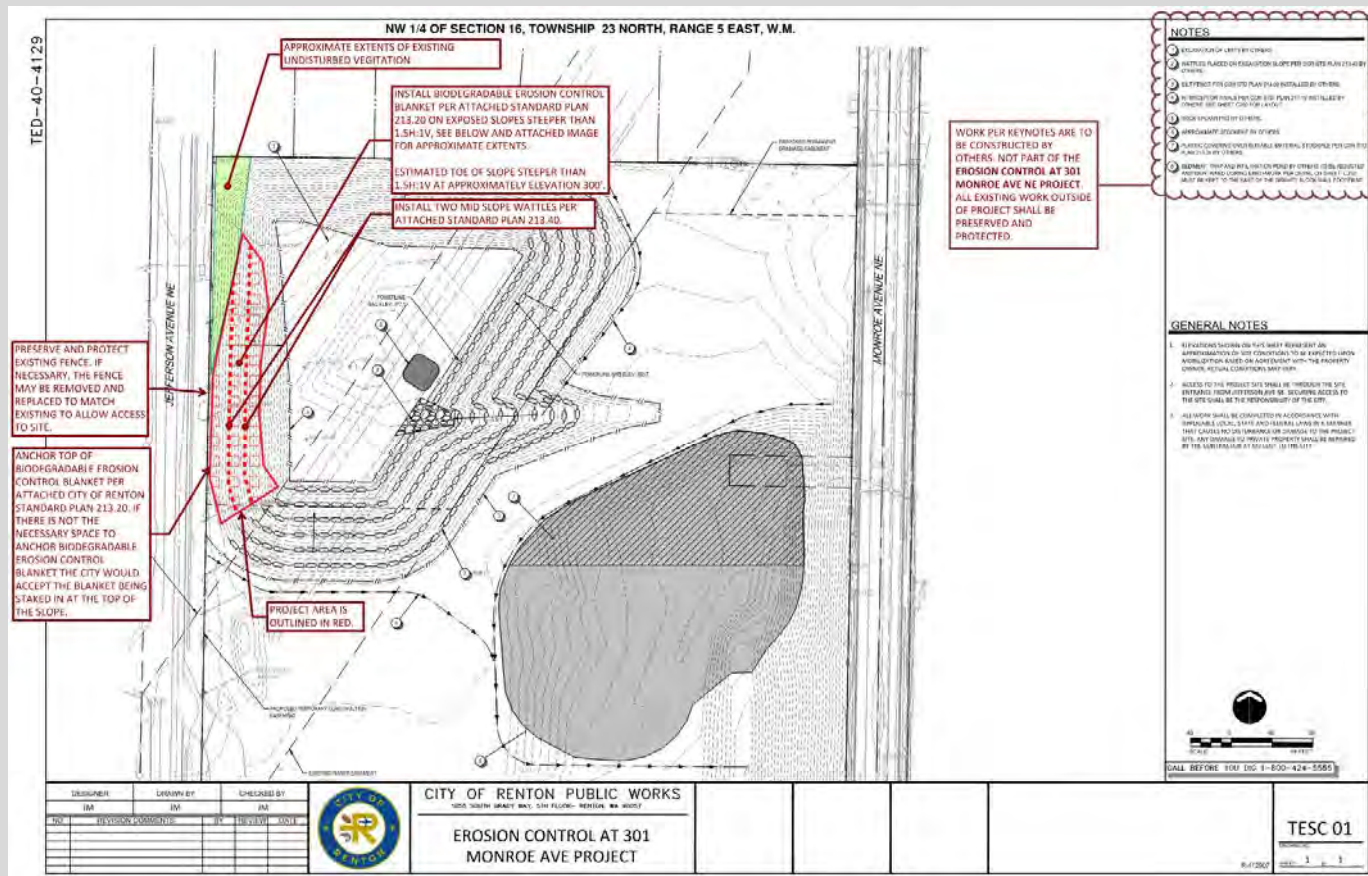
Erosion Control

Site Conditions – Prior to ESC Measures



Erosion Control

Oct 17, 2023: ESC Contract Plans

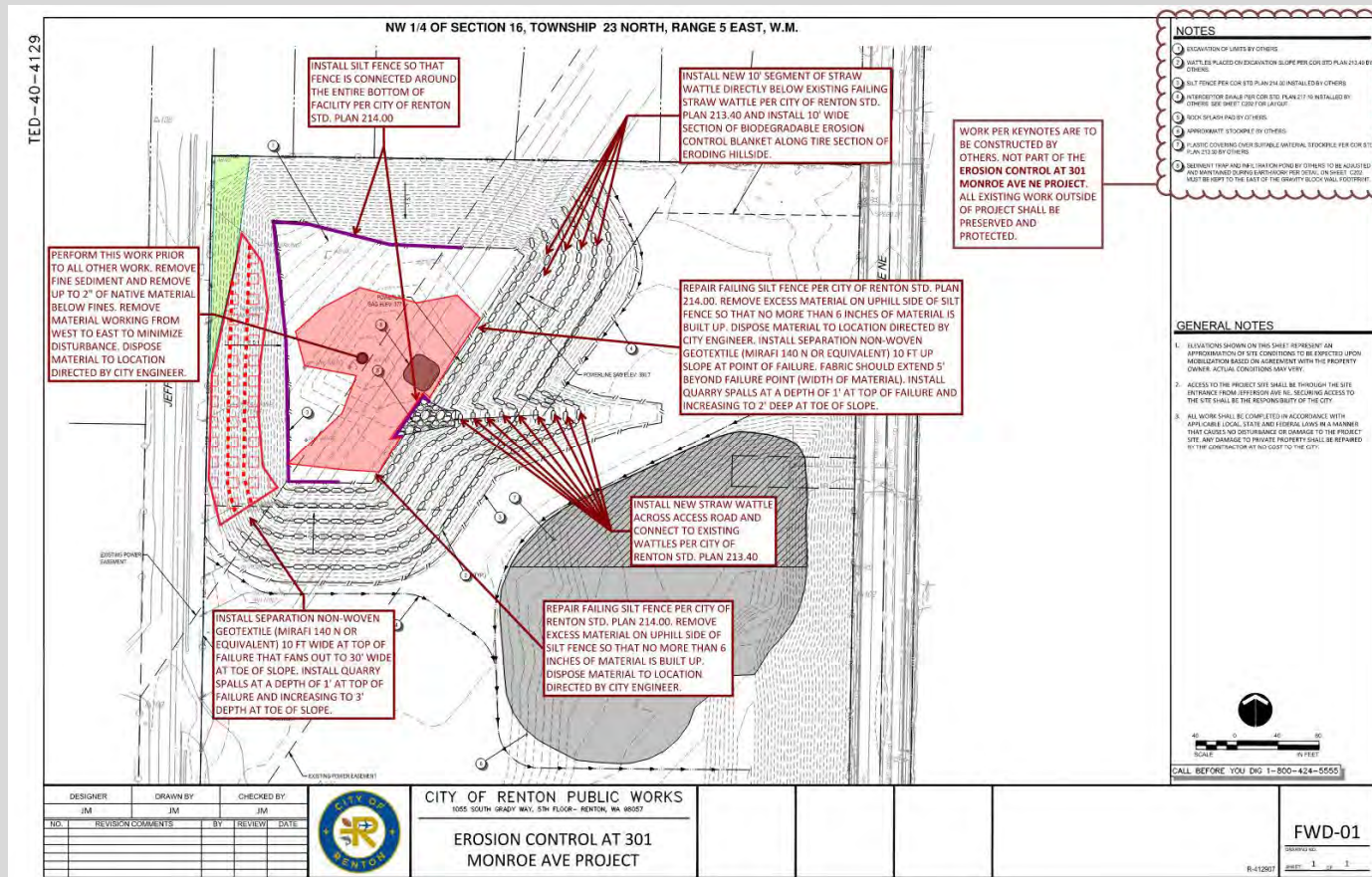


Erosion Control



Erosion Control

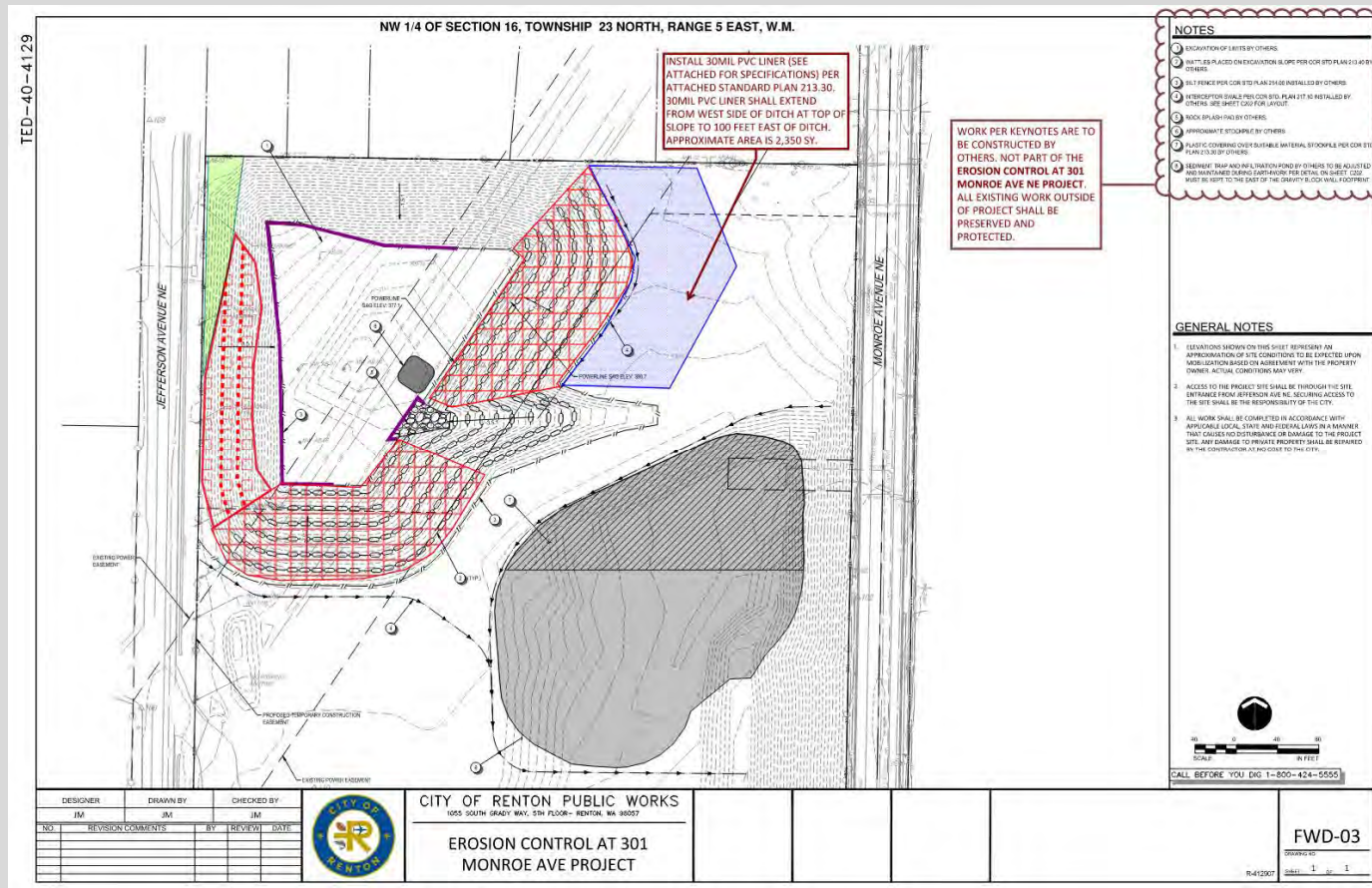
Nov 18, 2023: FWD-01



Oct 31, 2023: FWD-02



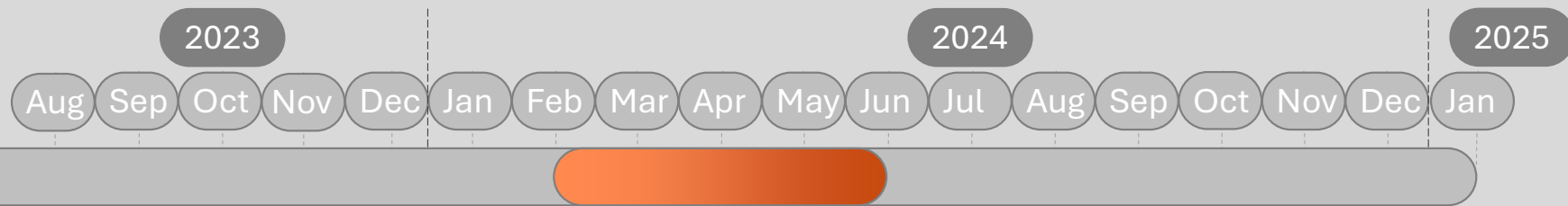
Nov 6, 2023: FWD-03



Erosion Control



Infiltration Fill



- ▶ Contractor: KLB Construction, Inc
- ▶ 6,250 Truck Loads – All Materials
 - ▶ 2,400 Truck Loads (73,600 Tons) – Infiltration Gravel
 - ▶ 20,000 CY – Onsite Non-Infiltration Fill (Stockpiled)
- ▶ Challenges:
 - ▶ Delivery
 - ▶ Tracking Tickets

Delivery



Photo Credit: Travis Gallatin – Fueled Photography

Infiltration Fill

Tracking Tickets

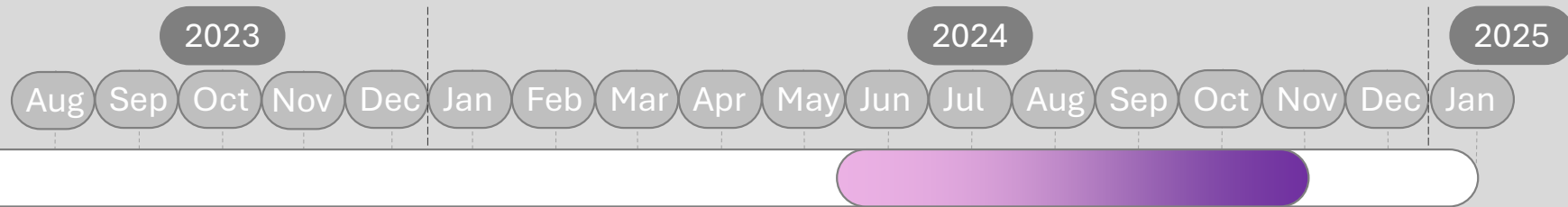


Infiltration Fill

Construction Photos



Site Construction



Site Construction

- ▶ Contractor: KLB Construction, Inc
- ▶ Hydrodynamic Separator / Flow Splitter / Conveyance
- ▶ Water Quality Vault
- ▶ Access Road
- ▶ Landscaping

Site Construction

Flow Splitter/Hydrodynamic Separator/Conveyance



Site Construction

Water Quality Vault



Site Construction

Access Road

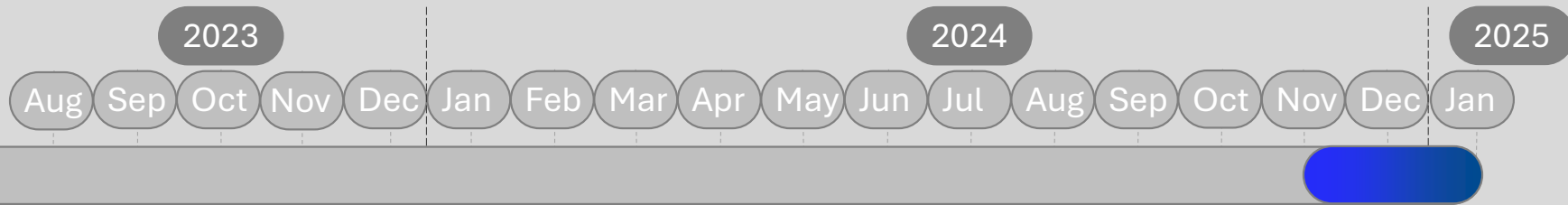


Site Construction

Landscaping



Project Closeout



- ▶ Physical Completion: January 29, 2025
- ▶ Project Cost: \$12,854,730.43
- ▶ Working Days Used: 230 of 320
 - ▶ Finished approximately 4 months ahead of schedule

Maintenance



Maintenance

- ▶ Adjusting Water Quality Weir Openings
- ▶ Cleaning Water Quality Facility
- ▶ Refining Maintenance Schedule



Takeaways & Lessons Learned

- ▶ Large Scale Proprietary Treatment Facilities
- ▶ Mother Nature vs Erosion Control (Be prepared to be flexible)
- ▶ Availability of Material
- ▶ Organization
- ▶ Reality and Impact of Maintenance

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Thank You!