

Problem Description

The University of Maryland (UMD) Golf Course maintenance facility currently faces several operational and environmental challenges. Existing buildings on site are deteriorating, storage space is limited, and the current open-air equipment washing area allows sediment, oils, pesticides, and other contaminants to enter surrounding soils, creating runoff risks and potential impacts to the nearby Anacostia watershed.

The goal of this project was to develop a new maintenance facility design that replaces deteriorating infrastructure, expands storage capacity, and incorporates an enclosed wash pad and filtration system.

The proposed design improves facility functionality, environmental protection, and operational efficiency by modernizing maintenance structures, increasing usable storage space, and implementing a sustainable wash-water management system that captures, treats, and recycles water in support of best management practices (BMPs).

Site Observations



Figures 1-2: Current storage areas with deteriorated or missing structural wood, doors, and windows. Vehicles are scattered outside of the sheds due to the lack of storage space.



Figures 3-4: Current two wash stations on project site. Left image is for pressurized water washes used to clean 10-12 machines daily. Hoses are improperly stored and the surrounding area has become eroded due to runoff. Right image is for chemical washes next to the chemical storage cabinet.

Material Selection

STRUCTURAL MATERIAL SELECTION SUMMARY

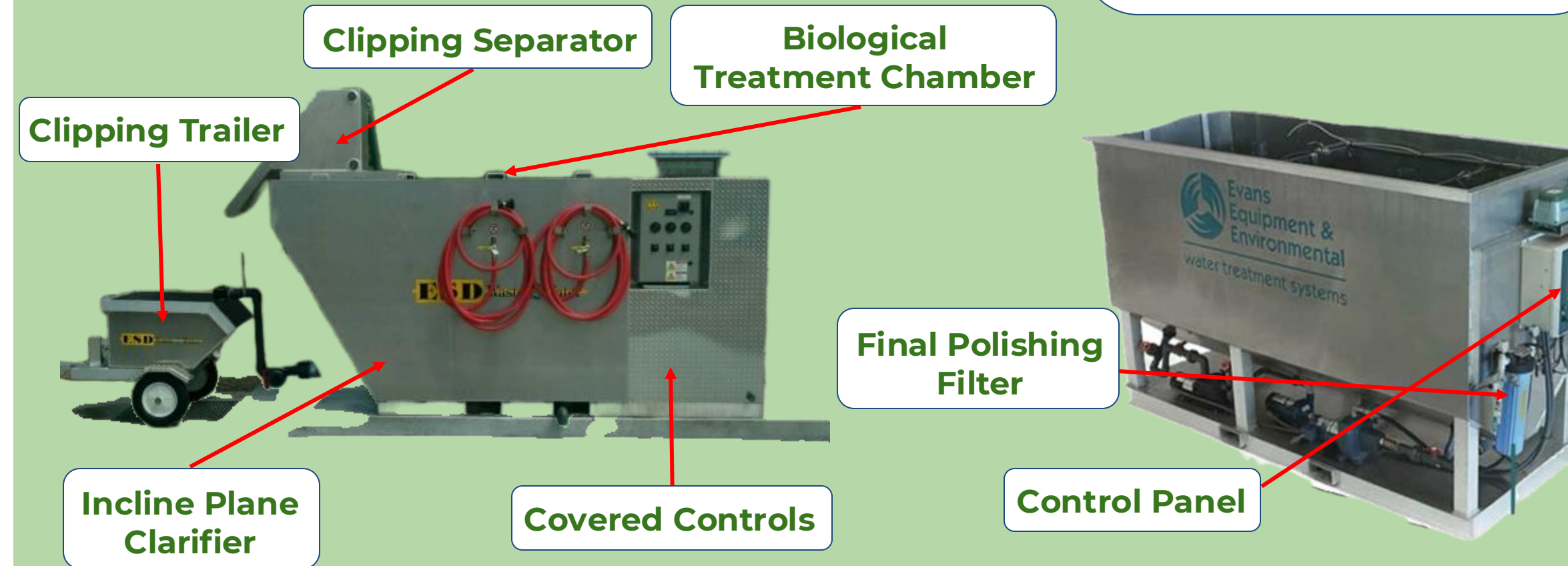
Material	Application	Specification	Justification
Reinforced Concrete	Wash Pad Slab	4,000 psi, 6-in thick, ACI 318	Heavy load capacity, moisture resistance
Reinforced Concrete	Building Foundations	6-in slab-on-grade, 4,000 psi, ACI 318	Stability, long useful service life
Structural Steel (Galvanized)	Canopy Frame	A992 columns and beams	High strength to weight ratio, corrosion resistance
Structural Steel (Prefabricated)	Barndominium Building Frame	Factory-fabricated clear-span system	Fast construction, flexible interior layout
Galvanized Steel Panels	Walls and Roofing	26-gauge corrugated with zinc coating	Weather protection, low maintenance
Timber (Pressure-Treated)	Localized Repairs Only	Roof framing replacement (Renovation Layout)	Cost-effective repairs in existing structures

Design Options

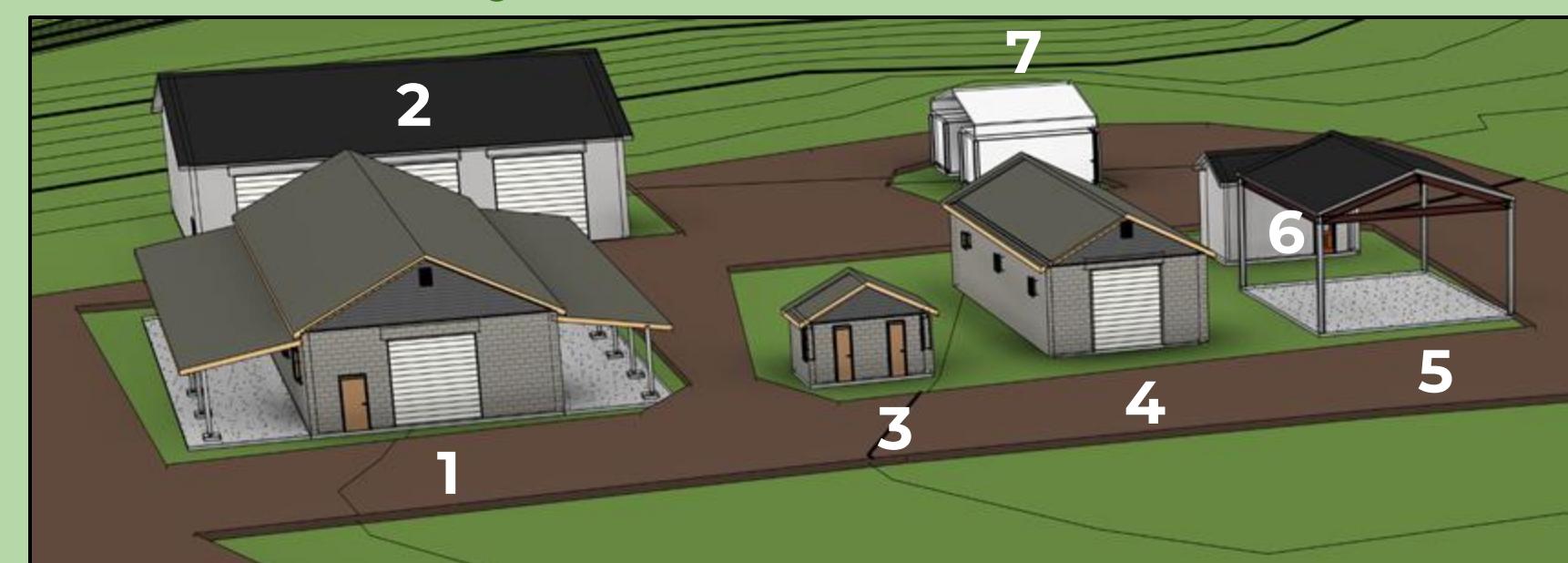
Design Combinations	Renovation (R)	Demolition (D)
ESD Waste2Water (W)	RW	DW
Evans Equipment & Environmental (E)	RE	DE

Four design-combination frameworks isolated by two key variables: **site treatment** and **filtration system**. Choose the best one based on:

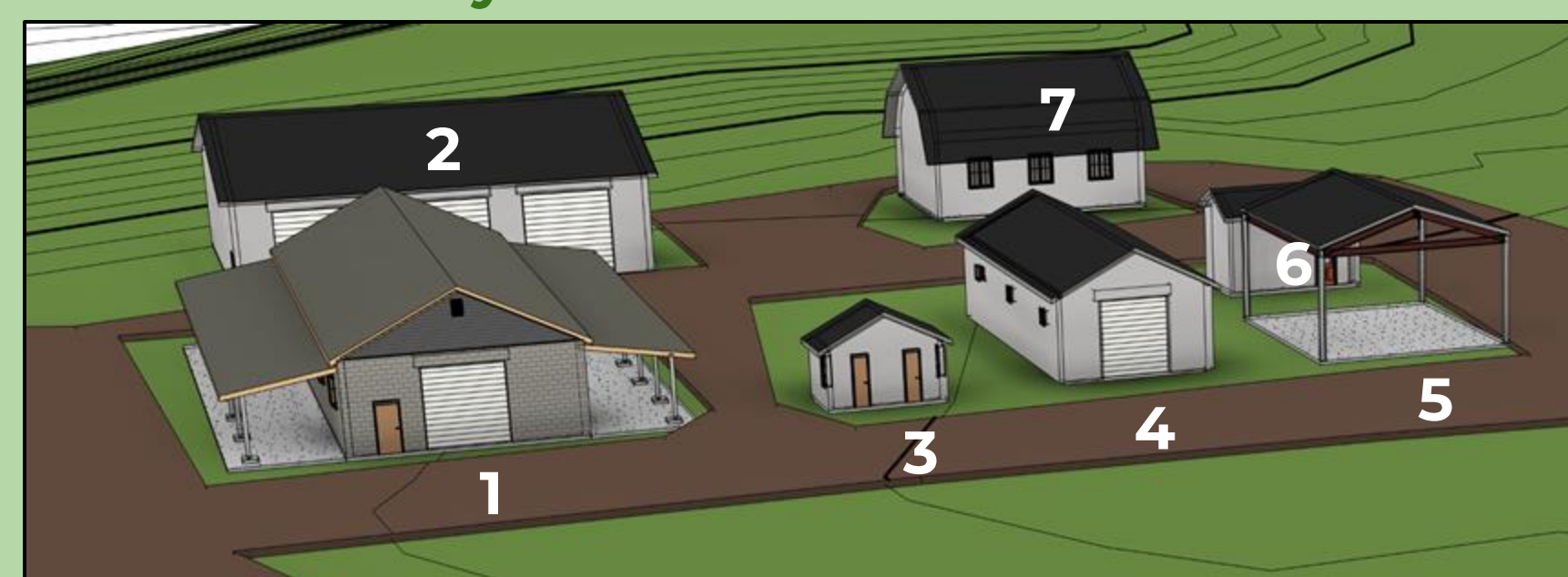
- feasibility
- cost
- sustainability



Renovation Layout



Demolition Layout



Both layouts include:

- Building 1** - repairs to existing maintenance shed
- Building 2** - new vehicle storage barn
- Building 5** - new wash pad canopy structure
- Building 6** - new filtration system enclosure

Renovation includes:

- Buildings 3 & 4** - repairs to existing bathroom + shed
- Building 7** - new sea can storage with canopy

Demolition includes:

- Buildings 3 & 4** - new bathroom + shed
- Building 7** - new equipment storage barn

Cost-Benefit Analysis

CONSTRUCTION COST COMPARISON

Cost Category	Renovation	Demolition
Subtotal Base Construction Cost	\$418,158	\$541,075
Installation, Labor, & Equipment (30%)	\$125,417	\$162,322
Contingency (10%)	\$41,805	\$54,107
Overhead & Profit (15%)	\$62,708	\$81,161
Total Estimated Project Cost	\$647,989	\$838,666
Cost Difference	Baseline	+190,677 (25%)

Filtration Vendor Decision Matrix	Cost	Purification Effectiveness	Maintenance & Reliability	Installation & Operational Requirements	Total (out of 20)	Quote
ESD Waste2Water	4	5	4	4	17	\$50,126
Evans Equipment & Environmental	5	3	3	3	14	\$75,000

KEY BENEFIT TRADE-OFFS

Renovation Strengths	Demolition Strengths
<ul style="list-style-type: none"> Lower embodied carbon – avoids producing new materials Less construction waste – only deteriorated parts removed Align's with UMD Sustainability Fund grant criteria Phased construction keeps facility partially operational 	<ul style="list-style-type: none"> Eliminated hidden deterioration risk in old structures Structural uniformity – all buildings same prefabricated steel system Meets current building codes Extended 40-60 year service life for new buildings

RECOMMENDATION

Renovation + ESD Waste2Water (RW) – Total: \$698,115
Best combination of cost savings, environmental performance, and alignment with UMD Sustainability goals.

Final Design

The final design features:

- Repairs to the existing maintenance shed**
 - HVAC, exhaust ventilation, ductwork, doors, and windows
- Repairs to one existing storage shed and bathroom facility**
 - Walls, lighting, roofs, doors, windows, and plumbing
- A new 64 ft x 54 ft structural steel barn**
 - For main vehicle and heavy equipment storage
- A new 34 ft x 30 ft concrete wash pad with steel canopy frame**
 - Demolition of existing deteriorated storage shed
- A new 20 ft x 11 ft steel-framed filtration system enclosure**
 - For ESD Waste2Water equipment storage
- Two new 20 ft x 8 ft sea can storages with steel canopy frame**
 - Demolition of existing deteriorated storage sheds