

Serene Cost Review

Below is a colorized copy of the “Opinion of Probable Construction Costs” dated 5/28/2020 that totaled \$773,873. At the June 2021 meeting it was hinted that final costs could be 20 to 30 percent greater because of price increases. This analysis examines the impact of recommended changes. Note that subtotal costs are increased by 19 percent (7 + 2 + 10) for possible overruns.

1. Western America is experiencing major water shortages that are likely to continue with supposed climate changes. It is therefore shameful that the Serene Construction Plan has a major component to waste water for no benefit. Prospect should demonstrate water conservation and maybe xeriscaping. I was at the meeting where the water rights were clarified. For years the intent was to line the upper (southern) pond to limit its leakage. That was under the false assumption that ponds on the property could be maintained full of water from the irrigation ditch. The investigations of the construction planning process revealed that irrigation water could not be stored but must be used quickly for some beneficial purpose. It was also revealed that the available water had a use-it-or-lose-it basis. So the leaders at that meeting proposed to use the water to irrigate the lowlands, and that idea became a major part of the plan specifications.

No one even asked if any of the landscape actually needed irrigation. No one questioned if the conservation easement allowed irrigation of the parts that were to be restored to natural habitat.

The conservation easement does specify that irrigation water could be distributed anywhere on the Serene Conservancy property. It also specifies that the property could be used for educational agriculture or else returned to natural habitat. Agriculture certainly could use irrigation water. The previous farming activities apparently did not have enough water for economic viability. Prospect has never, since acquisition of the property, chosen to activate the agricultural option. Irrigation water might also be used for lawn, as at many of the other Prospect properties, but lawn is not part of the Serene plan. That leaves the natural habitat option, especially for the interior 13 acres. By definition of “natural”, the augmentation of water to the landscape is a **violation** of natural conditions. The water source should be precipitation and ground water seepage only.

It is obvious by simple observation that nothing in the natural parts of the Van Bibber valley needs irrigation water. The grasslands of the Van Bibber Open Space Park and of the Serene Conservancy property remain in good condition even in drought periods. Please visit those areas and examine them with your own eyes!

Supplementing the water supply enhances the presence and growth of invasive weeds and other plants that should not be there. The decades-old leak of the irrigation ditch water in the southeast highlands of the property has created a cattail swamp with thistles and purple loosestrife. Cattails are supposed to be in wet bottom lands, not on high slopes. The overflow and leakage from the upper pond has promoted the measurable expansion of the willow shrubs downslope from the pond. When the willows mature and die they produce a tangle of branches that is very difficult to penetrate. The willows thereby provide protection for invasive thistles, mullein, teasel, and yellow toadflax. Cutting off both supplemental water supplies will begin the restoration of habitat to the expected natural conditions.

In the northeast corner the Serene plan proposes an excavation to drain water from the eastern pond and into Van Bibber Creek. It proposes a planting of wetland vegetation along the slopes of the excavation. But that channel is likely to lower the local water table and hinder the thriving of those plants. Pumping water to the eastern pond and then draining it to the Creek seems to be another waste of effort and water, causing damage to the existing habitat. That channel is not needed.

In the cost estimate table, those items that are strongly related to **irrigation** are highlighted in **red**. That includes the upper pond lining process, the pump and irrigation system, the electric service, and part of the earthwork,

including the wetland channel. That totals \$157,404, which increases to \$187,311 with the 19%. These parts of the plan should be abandoned.

2. At the time of the only public meeting the public had not been officially allowed on the property of the Serene Conservancy. Therefore they generally had no personal knowledge of its features. That obviously contributed to the poor and minimal public turnout for that meeting. There has been a major change in public awareness since then, and the public is developing strong opinions about what is being proposed for the changes in the Serene Conservancy property.

The recent COVID-19 restrictions prompted the relaxation of the access rules so that the public could exercise themselves and their pets on the existing lowland gravel loops and direct trail to the highlands. For the past year there has been an abundant use of the gravel loops in the lowlands. The people walk any of the loops in any order and in any direction. The gravel is a very durable surface, even holding up well under occasional horse passages. The usage has been sufficient to suppress vegetation along the center lines of the loops, nearly eliminating the need for mowing. The edges of the gravel loops are lined with healthy prairie grasses which do not need irrigation water.

Prospect should conduct interviews with the users of the gravel loops. It is expected that, given a choice of the continued existence of the gravel loops versus the artistic pattern of the paths in the construction plan, the public will now strongly desire the gravel loops for their exercise walks. The plan's trails lack the variety of the loops, forcing a return on the same path. Also, the natural surface loop will not be durable for such traffic.

The gravel loops have already proven their additional function as levees that contained the flooding of Van Bibber Creek in September 2013. Even though they are man-made, their composition is equivalent to sand bars and river gravel deposits, and their profiles are like natural levees. Removing the gravel and replacing it with clay soil excavated elsewhere will weaken their function as levees.

The quantity of gravel estimated in the plan is too small. The depth may be a foot down to any liner rather than a half foot. The width is about twice what is drawn in the plan because the drawing used only the path width that had been repeatedly mowed in previous years. The plan does not include the large (parking lot-sized) gravel in the southeastern part of the southern loop. The cost estimate for gravel loops removal, highlighted in orange, is only \$15,000, plus 19% increasing it to \$17,850. It could easily escalate to five times that amount with the total removal of all gravel. In addition, there will not be enough excavated material on the property to backfill what is removed in order to restore the original levee profiles. The cost of the backfill, hidden in the trails earthwork estimate, will be greatly more than suggested.

The removal of the gravel loops should be abandoned along with the artistic patterns of the proposed trails in that area.

3. The Serene plan proposes a trail of crusher-fine material crossing the lowlands to the eastern pond, then curving uphill with switchbacks to the southern entrance. There will be much cut and fill to maintain slopes of less than 5 percent. It ignores the existing direct pathway between the lowlands and highlands. The public presently uses the direct path. That is human nature. Though the unrestricted access of the public has led to a couple of other narrow paths on the property, there are no deviations along the existing direct pathway, the preferred route. That shows that the direct path is entirely acceptable to the visiting public.

At the planning meeting there was discussion about restricting the slope of the trail between the lowlands and highlands. The reason was to comply with ADA specifications for access by handicapped persons. It was also noted that parks in hilly areas are not required to provide such slopes, as shown by the Jeffco Open Space trails patterns. Handicapped persons have full access to the lowlands from the new parking lot. They can have full

access to the highlands (upper pond area) from the southern entrance.

At Two Ponds National Wildlife Refuge the eastern hillside has a slope-restricted switchback trail and a direct route that is a shortcut through the other trail. The slope-restricted trail received insufficient use to suppress encroaching vegetation, and so it had to be resurfaced with crusher-fine material. People prefer direct routes.

The cost estimates related to the crusher-fine trail are colorized in cyan. They total \$57,450, plus 19% increasing it to \$68,366. Human nature suggests that if such a trail is built, the public will create their own direct pathway between the lowlands and highlands, leaving the crusher-fine trail seldom used. The design of the crusher-fine trail is inferior for the public that uses the gravel loops for exercising themselves and their pets. Though a durable trail between the lowlands and highlands is needed, the design in the Serene plan should be abandoned.

4. The Serene plan has much area being seeded with various grasses and other plants in order to restore the disturbed areas. The large areas to be treated show how much environmental damage this Serene construction plan inflicts on areas that have already been restored to natural habitat, and that restoration was done without any irrigation water supplement. If the irrigation, gravel loop removal, and artistic trail plans are abandoned, that means essentially no work being done on the eastern 13 acres of the property, and therefore no need for seeding those areas.

The shelter and playground areas will have construction scars that will need to be seeded. The irrigation plan for those areas should also be abandoned. The present healthy grass cover shows that irrigation is not needed. The present dominant grass species is smooth brome, and that is proposed to be the seed species in that area. Smooth brome is not native to our area, though it is a dominant survivor. The Serene plan has a native grass seed mixture specified for the lowland disturbed areas. That is what was already used over the past decade for barren areas in the lowlands, and it prospered very well there. So I recommend using mix (1) around the shelter and playground areas, not mix (2). The area is also suitable to have Buffalograss be the majority in the seed mixture. It survives well on sunny clay with only natural precipitation. Its full grown height is only about 4 inches, so it does not need to be mowed. I can show unwatered Buffalograss covers on my own property and the adjacent Croke Canal bank.

The cost estimates related to vegetation restoration are colorized in green. They total \$34,964, plus 19% increasing it to \$41,607. Most of that will go away with the abandonment of construction in the eastern 13 acres of existing natural habitat.

Summary, using the 19% increases: \$187,311 + \$17,850 + \$68,366 + \$34,964 = \$308,491 though the second value is likely greatly underestimated and the fourth value should be reduced a little by what is needed around the playground area. That total is 40% of the plan total estimate of \$773,873. It involves abandoning everything related to irrigation and the proposed trail design, essentially leaving the eastern 13 acres in its present natural state with its gravel loops for public exercising activities.

Alternates:

5. Crusher-fine material (and fabric underlay) could strengthen the **existing direct pathway** between the lowlands and highlands. That pathway has a 4 foot width with present usage. The distance from the southern entrance to the southeast corner of the southern gravel loop is 911 feet. That makes an area of 3644 square feet. Using the same \$2.60 / sq.ft. from the cost estimate gives \$9,474, plus 19% increases it to **\$11,275**. (That replaces the \$68,366.)

6. Rather than line the upper (southern) pond to reduce leakage, line the **Alford Selman Lateral Ditch** from near the pipe end across the Croke Canal to south of the southeast corner of the Serene Conservancy property.

That will limit seepage of irrigation water to the sides of the Ditch and plug the leak that created the cattail swamp. The length of that part of the Ditch is 700 feet. A 4-foot wide liner folded into the Ditch will be adequate to confine the water. That makes an area of 2800 square feet of liner material. Using the cost ratio for lining the upper pond, that indicates a cost of \$4,480. Adding 19% increases it to **\$5,331**. That is much less than the \$24,208 plus 19% for the pond liner itself (apart from earthwork costs for the pond).

SERENE CONSERVANCY TRAILS AND NATURE PLAY
Opinion of Probable Construction Costs: 100% Design

5/28/2020

100% Construction Documents					
Item #	Work Item	Unit	Quantity	Unit Cost	Subtotal
015713-01	STORMWATER PROTECTION & CONSTRUCTION FENCE	LS	1	\$20,340	\$20,340
017123-01	FIELD ENGINEERING (SURVEYING)	LS	1	\$6,000	\$6,000
018950-01	CLEAR AND GRUB (Approx. 2 AC, incl. pond area)	LS	1	\$16,000	\$16,000
018950-02	DEMOLITION - GRAVEL ROADS (Approx 28,000 SF, estimated 6" depth)	LS	1	\$15,000	\$15,000
018950-03	DEMOLITION - MISCELLANEOUS	LS	1	\$5,000	\$5,000
101400-01	INTERPRETIVE SIGNS	EA	4	\$4,000	\$16,000
116800-01	NATURE PLAY AREA (w/ curbing, surfacing, ramps, underdrain, etc.)(excl. conc walks)*	LS	1	\$187,509	\$187,509
132800-01	PARK SHELTER (POLIGON REC 20X24)	LS	1	\$38,247	\$38,247
132800-02	PORTABLE TOILET ENCLOSURE (POLIGON PLE-HC1)	LS	1	\$27,630	\$27,630
260000-01	ELECTRIC SERVICE AND METER	LS	1	\$12,000	\$12,000
	EARTHWORK (Approx 1,605 CY as described below - volumes are estimates)				
	PLAYGROUND (185 CY cut, 135 CY fill, 50 CY to backfill gravel roads)				
312000-01	POND EXCAVATION (300 CY) (dispose at pond outside liner)	LS	1	\$21,295	\$21,295
	POND LINER COVER (450 CY @ 1" depth, stockpile and re-place)				
	TRAIL (520 CY cut, 165 CY fill, net 355 CY to backfill gravel roads)				
	WETLAND CHANNEL (150 CY)				
312219-01	FINISH GRADING (incl. pond and restoration areas)	AC	3.5	\$3,000	\$10,500
312219-02	NATURAL SURFACE TRAIL	SF	3,695	\$1.20	\$4,434
313119-01	WEED MGT (Approx 3.5 AC, spot spray 1 year)	LS	1	\$5,250	\$5,250
321313-01	CONCRETE PAVING (6" thick)	SF	5,630	\$6	\$33,780
321540-01	CRUSHER FINES TRAILS (excl. playground)	SF	13,289	\$2.60	\$34,551
323129-01	FENCING - 2-RAIL POST AND DOWEL	LF	913	\$13	\$11,869
323219-01	MODULAR BLOCK RETAINING WALL (w/ underdrain)	FF	400	\$40.00	\$16,000
323300-01	BENCHES	EA	4	\$1,750	\$7,000
323300-02	BIKE RACKS	EA	2	\$1,100	\$2,200
323300-03	PICNIC TABLES	EA	4	\$1,375	\$5,500
323300-04	TRASH CANS	EA	1	\$775	\$775
328400-01	IRRIGATION: POND LINER (Est. 15,130 SF)	LS	1	\$24,208	\$24,208
328400-02	IRRIGATION: INTAKE PIPE & CONCRETE WET WELL	LS	1	\$15,000	\$15,000
328400-03	IRRIGATION: PUMP STATION & CONTROLS	LS	1	\$22,000	\$22,000
328400-04	IRRIGATION: DISTRIBUTION SYSTEM (mainline, drip and spray zones, flow sensor, riser)	LS	1	\$45,755	\$45,755
329219-01	NATIVE DRILL SEEDING & MULCHING (Mix #1) (w/ spray/disc brome)	AC	2.7	\$6,000	\$16,200
329219-02	BROME DRILL SEEDING & MULCHING (Mix #2)	AC	0.9	\$3,000	\$2,700
329300-01	SHRUBS (#5 CNT)	EA	27	\$45	\$1,215
329300-02	TREES (2" B&B)	EA	6	\$625	\$3,750
329300-03	WETLAND PLUGS (5,500 SF, 24" OC)	EA	1,595	\$4	\$6,380
329410-01	LANDSCAPE BOULDERS	EA	17	\$300	\$5,100
334400-01	STORM UTILITY DRAINS: 12" RCP FLARED ENDS	EA	2	\$1,000	\$2,000
334400-02	STORM UTILITY DRAINS: 12" RCP PIPE	LF	10	\$150	\$1,500
334400-03	STORM UTILITY DRAINS: 6" SDR 35 PVC PIPE	LF	90	\$60	\$5,400
334400-04	TREE AERATION: CATCH BASIN W/ RISERS	EA	1	\$600	\$600
334400-05	TREE AERATION FILL - PIT RUN (~10 CY)	LS	1	\$500	\$500
334400-06	TREE AERATION PIPING - 4" SOLID AND PERF PVC (with fittings)	LF	75	\$15	\$1,125
				SUBTOTAL	\$650,313
007200-01	GENERAL CONDITIONS & BONDING (7% of subtotal)	LS	1	\$45,522	\$45,522
017113-01	MOBILIZATION & DEMOBILIZATION (2% of subtotal)	LS	1	\$13,006	\$13,006
				Construction Contingency - 10% of subtotal	\$65,031
				TOTAL	\$773,873

* See separate cost estimate by Gaia Designs

7. Now that the public is becoming aware of the proposed construction plans for the Serene Conservancy property, another, more informed, public meeting should be held before the contracting process begins. The neighborhood has been changing, increasing the number of families with children who are learning to enjoy the nearby Serene Conservancy property.

Analysis by Dr. Ed Holroyd, 16 October 2021
303-279-5395; 5395 Howell St., Arvada, CO 80002-1523
eholroyd@juno.com; eholroyd3@juno.com; www.EdHolroyd.info