

Centennial Park Feasibility Study

Richfield Engineering Design Class

November 2019

Introduction

Since it was constructed in 2004, the Centennial Park has progressively become a problem for Richfield City. Settling of the ground has buckled asphalt parking lots and roads along the west side of the park, resulted in playground equipment being knocked off center, and damaged plumbing to the park's bathrooms. The purpose of this study is to determine the scale of the damage to the park, extent of repairs, and to propose new features to the park that will attract new visitors.

Park Description

Centennial Park is located on Main Street, between 1000 N and Centennial Park drive (Figure 1). The park is bordered by two vacant lots to the southeast and commercial buildings to the north. The vacant lots are owned by Deer Run Timber LLC and have a combined market value of \$126,000.

Boundaries and Description

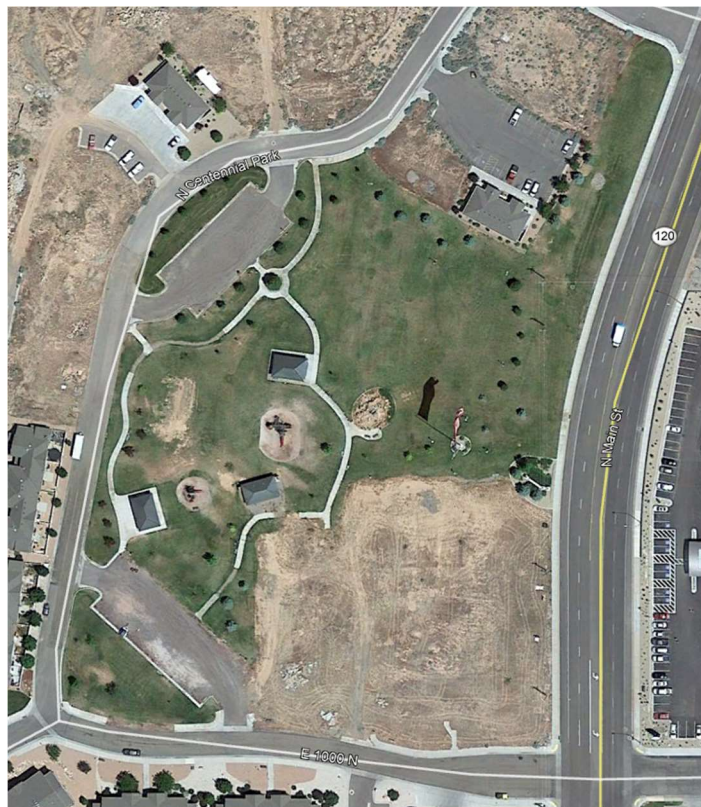


Figure 1. Centennial Park

History

Centennial Park was constructed in 2004. Richfield City provided a drawing that shows the original plan for the park, seen in Figure 2.

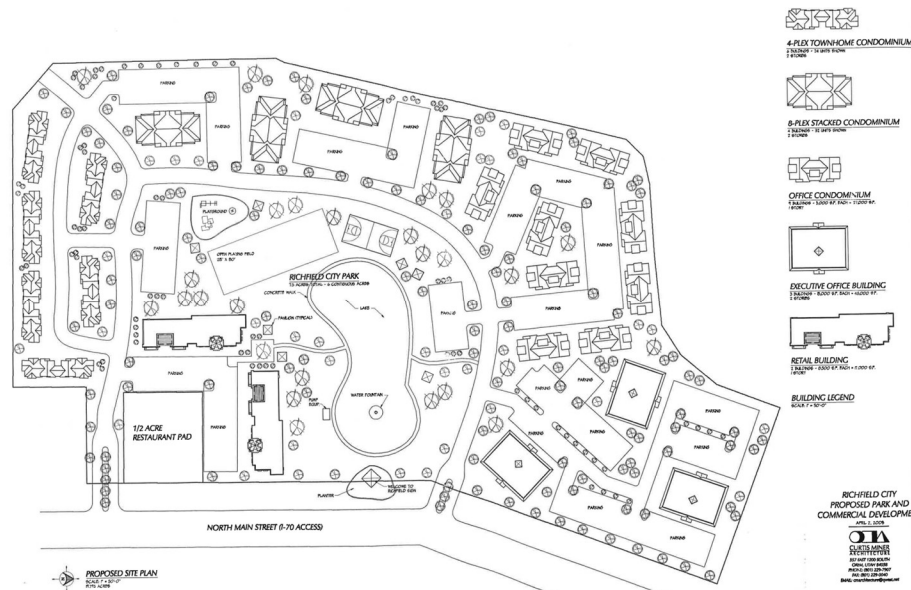


Figure 2. Preliminary Concept Design of Centennial Park

Since 2004, settling has damaged sidewalks, parking lots, roads, playgrounds, and plumbing to the bathrooms. Settling has been blamed on the park being built on a landfill.

Current Condition

Currently the park is in need of repair. A list of damaged items was developed and it was determined which of the items are critical for the city to repair.

Sidewalk, Concrete Pad, and Handicap Ramp

Due to settling, sidewalks are severely damaged and parts are missing. Sections of sidewalk are missing along 1000 N and by the north parking lot (Figures 3). In place of sidewalk there is loose gravel and weeds. The concrete pads by the pavilions, have large cracks up to an inch and a half wide (Figure 4). The handicap ramp at the south parking lot is missing and the handicap ramp at the north parking lot is damaged (Figures 5 and 6). It is critical to repair the handicap ramp.

ADA Requirements

The American with Disabilities Act (ADA), requires wheelchair access to public places. Any ramp built must have a slope of 12 to 1; meaning for every 12 inches of length the ramp rises 1 inches.



Figure 3. Damage Sidewalk



Figure 4. Damage Concrete Pad



Figure 5. Damage Handicap Ramp



Figure 6. Damage Handicap Ramp

Parking Lots

Both the north and south parking lots have been damaged by settling. The curb and gutter for both parking lots is deformed. This creates depressions where water gathers and weeds grow (Figures 7,8, and 9). To repair the damaged parking lot, the city has placed milled asphalt over the top of it. The milled asphalt is not evenly distributed and in some locations it has buried the curb.



Figure 7. North Parking Lot



Figure 8. North Parking Lot



Figure 9. North Parking Lot

Curb and Gutter

In many areas the curbs are buried, damaged, or missing all together (Figures 10, 11,12,13,14,15, and 16). The damage to the curbs and gutters does not allow for storm water to drain properly. This causes large pools of water to form and exacerbates the problems caused by settling.



Figure 10. Centennial Park Drive



Figure 11. Centennial Park Drive



Figure 12. North Parking Lot Curb and Gutter



Figure 13. North Parking Lot Curb and Gutter



Figure 14. South Parking Lot Curb and Gutter



Figure 15. Centennial Park Drive Curb and Gutter



Figure 16. 1000 N Gutter

Fountain

Currently the Fountain does not work, the rocks are breaking off, and weeds are growing in the cracks (Figure 17).



Figure 17. Water Fountain

Restrooms

The restroom wall is damaged with missing cinder blocks, and cracks from top to bottom (Figure 18). The building has been retrofitted with piles to protect against settling.



Figure 18. Bathroom Wall

Alternatives

Alternative 1: Complete Rebuild

This alternative is to completely rebuild Centennial Park to the original design. In order to do this, the city needs the help of professional engineers and contractors.

Before starting any work, a geotechnical survey is needed to understand the settling that has occurred and is still occurring at the park. All parking lots, sidewalks, curb, and gutters will need to be replaced, along with regarding the ground such that storm water drains to 1000 N.

Alternative 2: Partial Rebuild

This alternative address park repairs that the city can perform without a professional engineer but that might still require a contractor. These are, handicap ramps, sidewalks, curbs and gutters, parking lots, concrete pads, and bathroom wall. Table 1, shows features and the recommended repairs.

Table 1. Recommended Repairs

Handicap Ramps	Replace broken handicap ramps with dirt ramps with a slope of 12 to 1. (For every 12 inches of length, it will rise 1 inch.)
Sidewalks	Replace sidewalk with dirt path as needed.
Curb and Gutter	Remove and grade to drain into grass
Parking Lots	Remove curb and gutter. Slope to drain
Concrete Pads	Fill large cracks with caulk
Bathroom Wall	Repair or replace broken/missing cinder blocks

Alternative 3: Partial Rebuild and New Features

This alternative includes all repairs in Alternative 2 and the building of new features. New features were added to attract people to the park, better utilize space, and to meet existing demand. The new features follow these criteria; Cost, Public demand, Safety, Variety/Uniqueness, and Settling Compatible. Below is the list of new features.

- Dog Park Extension
- Exercise Stations
- Outdoor Movie Screen
- Dirt Trail
- Small Hill
- Large Hill
- Pump Track
- Benches
- Drinking Fountains
- Fencing

Extended Dog Park: The current dog park serves a large amount of interstate travelers. To better serve these users, an extension was design. This extension will be added to the east side of the dog park (see DT02).

Exercise Stations: The exercise stations are manufactured by a company called, Fit Trail. The stations come in a set of 10, they are assembled onsite, cemented into the ground, and surrounded by a 20' by 20' sandpit. The sandpit will be 1-foot-deep and bordered by railroad ties, see details DT06 and DT08. The stations will be placed around the park by either existing sidewalk or by the new dirt path that circles around the north field.

Dirt Path: The dirt path will serve joggers and people using the exercise station that are located by the path. The dirt path is a simple path, built using existing dirt (see DT04).

Outdoor Movie Screen: This consists of an outdoor projector, movie screen, and two 20' poles to mount the movie screen. The screen can be raised and lowered on the poles, using rope and pulleys. The projector can be stored in the nearby city buildings. In order to comply with copyright laws, the city must use a distributor (i.e. swank.com and Criterion Pictures Inc.) to purchase the rights to play the movies in a public space. This can cost between \$300 to \$550 per movie (life time use), newer films are more expensive, but discounts are available if you buy more than one movie.

Big Hill: This will first, provide seating for the outdoor movies and second, provide a place to play and sled. The hill will be constructed in 12 inch compacted lifts (see DT01), using stockpiled dirt dredged from local canals or detention basins.

Small hill: The small hill will have a maximum height of 5 feet and will slope down. Grass seed will be planted on the hill, and the rocks will be rearranged (see DT03).

Pump Track: Will consist of a small pump track that will serve kids, ages 1 to 6 years. A large pump track, that will serve kids, teenagers, and adults ages 7-year-old and up. Four skill trails that will increase in skill level (beginner to intermediate). Small rollers, large rollers, small tables, and medium tables will be included in the skill trials (see DT07).

Recommended Alternative: Partial Rebuild and New Features

It is recommended that alternative 3 be used to repair the park and attract visitors to the park. Alternatives 1 and 2 do not meet the needs of the park and the city. Alternative 1 is not recommended due to the cost of a geotechnical study, engineer's plans, and construction. Alternative 2, is not recommended because it does not address the need to attract visitors to the parks.

Final Design:



Figure 19. Final Design Layout

Cost Estimate

These costs were determined from available commercial resources. Prices may be reduced if the client performs the work.

Feature	Materials	Unit	Quantity	Cost/Unit	Total Cost
Dog Park	Chain Link Fence	LF	285	6	\$1710
Exercise S.	Equipment	10 station	1	6000	\$6000
	Concrete	Each	55	4.6	\$253
	Sand	CY	167	30	\$5010
	Railroad Ties	LF	860	2.4	\$2064
Movie screen	Poles	Each	2	150	\$300
	Screen	Each	1	120	\$120
	Projector	Each	1	1000	\$1000
	Copyright	Each		\$300-\$540	\$300
Small Hill	Rocks	Each	50	5	\$250
	Dirt	CY	72	15	\$1080
	Topsoil	CY	67	40	\$2670
	Grass (seed)	SF	4500	1.85	\$675
Large Hill	Dirt	CY	1308	15	\$19625
	Topsoil	CY	300	40	\$12000
	Grass (seed)	SF	14000	1.85	\$2100
Dirt Trail	Construction	LF	600	0.95	\$570
Bench	Bench	Each	7	320	\$2240
Fencing	Post and Rail	LF	540	4	\$2160
Drinking Fountain		Each	5	1000	\$5000
Pump Track	Construction	Each	1	5000	\$5000
Total					(seed) \$69,800 (Sod) \$101,300