

Fabled Oaks Farm - Swale System & Access Earthworks

Implementation Elements

- 1) [Northwest Vineyard Swale](#) (NVS)
 - a) Length: 146' | Bottom Width: 30" | : Depth From Sill: 1'
 - b) **Details:** To be fed by the [Carancho Run-On Pick-Up](#) (sandbag to avoid curb cut) at the northernmost end. The pick-up will be a drain, 27' in length over earth, additional 5 - 10 over concrete (sandbags). Hand digging will be required to ascertain depth and exact location of buried utility lines.
- 2) [Rolling Dip 1](#) (RD1)
 - a) Dimensions
 - i) Transfer Length: ~30'
 - ii) Linear Length: 21'
 - iii) Road Width: 21'
 - iv) Roll Out Length: 30' (~ 2x length of towing truck)
 - b) **Details:** 4-8% drain grade, 4-8% reverse grade paralleling drain, 30' roll out, approximately 13 yards road base required if not excavating anything. Will require some additional road base to achieve desired height and harden/roughen the bottom to resist degradation from driving and water movement.
- 3) [Sediment Trap for RD1-West Olive Swale transition](#) (RD1ST)
 - a) **Dimensions:** Wide enough for ranch tractor to drive in from the west and use the bucket to clear out accumulated sediment.
 - b) **Details:** Water will be transitioning across the driveway at a steeper grade than the swale bottom (which is flat). To prevent the swale entrance from plugging and causing a break in the berm from sediment accumulation, a depression will be created that is deeper than the swale bottom and wide enough to permit a ranch tractor to use the bucket to clean out sediment on a seasonal basis. This depression will be located between the discharge point from RD1 and the beginning of the West Olive Swale.
- 4) [West Olive Swale](#) (WOS)
 - a) Length: 280' | Bottom Width: 30" | Depth From Sill: 1'
 - b) **Details:** Will be fed by [Rolling Dip 1](#) across the West Driveway from the Northwest Vineyard Swale. This rolling dip will at least need to be surveyed prior to beginning construction of this swale - exact exit point from the dip will depend on lasering from the uphill side of Culvert 3 across the main driveway. Selective olive tree removal may be required for machine access and accurate laser surveying.
 - c) **NOTE:** Secondary spillway in the middle of this swale ~ 40' long for heavy flow events, discharging to Culvert 2.

- i) Are we keeping the trees for resale? **FOR REPLANTING DEAD ONES**
 - ii) Are we keeping the existing irrigation infrastructure intact? **YES**
 - (1) If yes, we will need to scrape soil from a broader area to build up the berm (as a substitute for not digging as deep).
 - (2) How deep is the existing olive and vineyard irrigation? **YES**
- 5) Culvert 3 Entry Sill
 - a) Dimensions: Will depend on final West Olive Swale (WOS) location and sizing.
 - b) Details: Links and transitions water from West Olive Swale to Culvert 3. Will require handwork, stone knitting to create dissipation pool and sill for entry into culvert. Dissipation pool prior to culvert entry should be deeper than the culvert to allow for sediment to fall out of suspension prior to transiting the culvert length.
- 6) Culvert 3 Discharge Basin
 - a) Dimensions: Will depend on final swale location and sizing
 - b) Details: Placed at exit from Culvert 3 linking West Olive Swale with East Olive Top Swale. Will require handwork and stone knitting. Can reorganize and utilize rocks already present. Should have an armored pool slightly deeper than the swale bottom to dissipate water energy prior to entry into the swale.
- 7) [East Olive Top Swale](#) (EOTS)
 - a) Length: 267' | Bottom Width: 30" | Depth From Sill: 1'
 - b) **Details:** Will be fed by Culvert 3 linking to West Olive Swale. Will require select tree removal for accurate laser surveying. Same questions apply as for West Olive Swale above. ~50' spillway located just west of the ridgeline separating the olives from the old fruit orchard. Run-off collection drain on east end ~ 88' long, collects discharge from remodeled raintank overflow pipe.
- 8) East Olive Top Swale East Drain
 - a) Length: 88'
 - b) Details: survey at ~ 1% grade, install with ex, finish by hand, ultimately plant to vetiver.
- 9) [East Olive Middle Swale](#) (EOMS)
 - a) Length: 291' | Bottom Width: 30" | Depth From Sill: 1'
 - b) **Details:** EOMS spillway is ~ 50' and off-set to the west of EOTS spillway (above). Spillway should end up approximately on top of the existing small orchard access road leading through this block - may need to install a small berm to prevent spillway discharge from moving across the road bench's surface. Select trees will need to be removed for accurate laser survey and machine access. Same questions apply as for the West Olive Swale.
- 10) East Olive Middle Swale East Drain
 - a) Length: 85'
 - b) Details: Drain @ 1% grade.
- 11) [East Olive Bottom Swale](#) (EOBS)
 - a) Length: 163' | Bottom Width: 30" | Depth From Sill: 1'
 - b) Details: Spillway of 44' positioned above Rolling Dip 2 cross point.
- 12) East Olive Bottom Swale East Drain
 - a) Length: ~55', 1% grade

13) East Olive Bottom Swale West Drain

- a) Length: ~ 35', 1% grade

14) [Rolling Dip 2](#) (RD2)

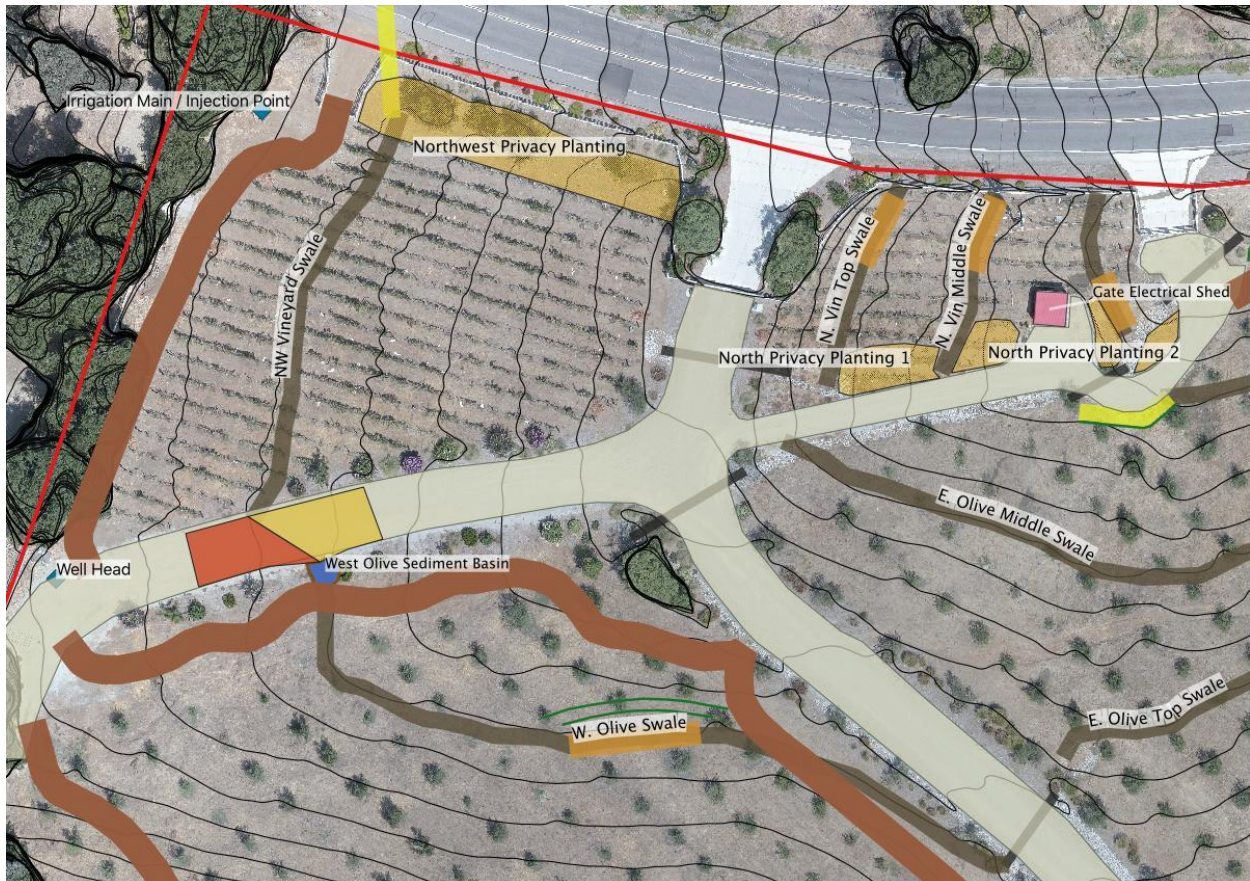
- a) Length: 35'
- b) **Details:** Discharges across the lower orchard access road and down the steep but short slope to the existing drainage from the property back onto Carancho. This section will require geological stabilization initially (see Rolling Dip 2 Rundown below). Will require some additional road base to achieve desired height and harden/roughen the bottom to resist degradation from driving and water movement.

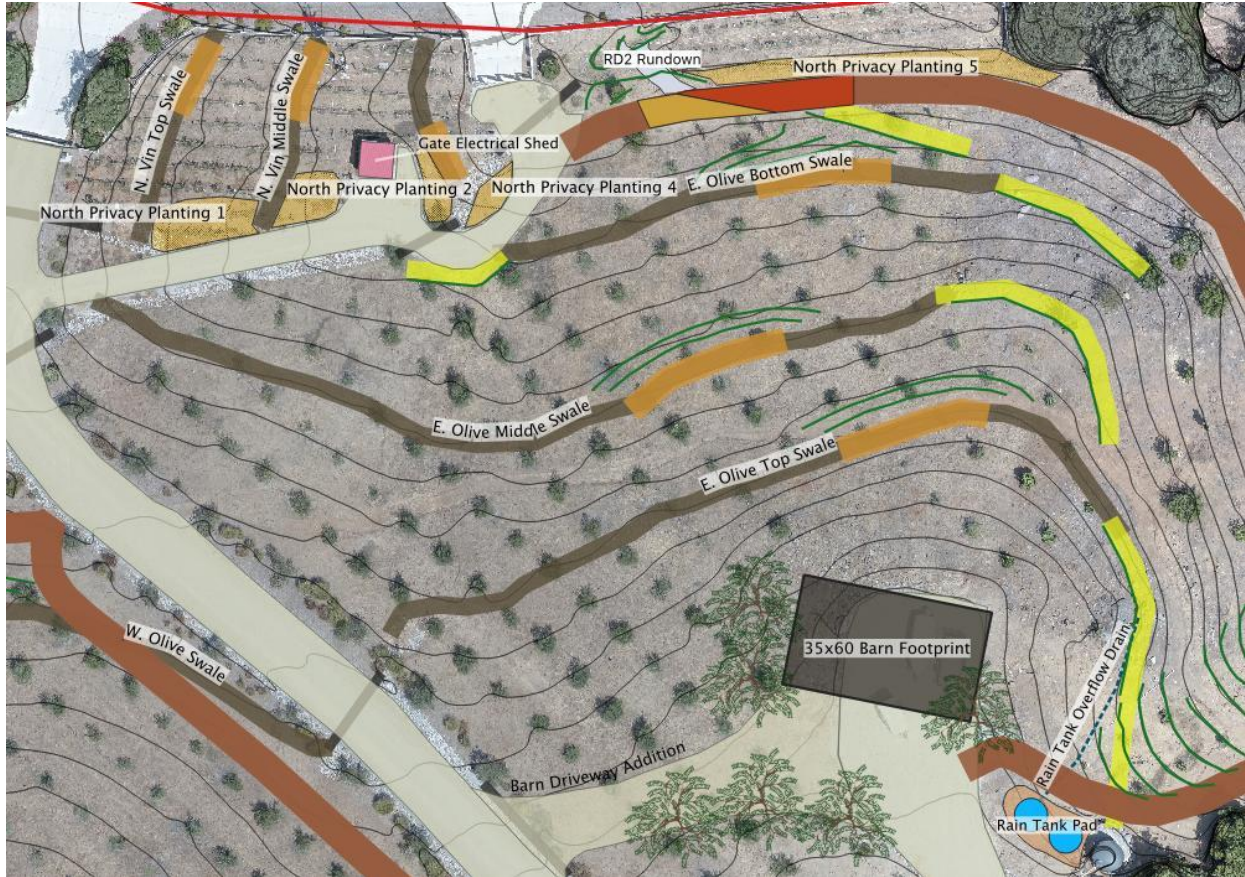
15) Rolling Dip 2 Entry Drain (RD2ED)

- a) Length: 50'
- b) **Details:** 2% drain, can be hand dug with rogue hoe or done with excavator. Ultimately plant to vetiver.

16) Rolling Dip 2 Rundown. (RD2R)

- a) Area: 135 square feet
- b) **Details:** Handwork required here to knit together the rock and create an erosion-proof rundown to the drainage bottom. Drainage bottom will have a small dissipation pool with a tips-down media luna discharge. Start from bottom.





Workflow

Day 1 (Wednesday 2/3/21)

- Excavator?
 - Clearing trellis and trees to allow for final surveying
 - Mini-ex for trees if wanting to save, otherwise can be cut down with chainsaw or by hand
 - Trellis decommission - saving materials? If so, disassemble by hand, if not, remove with mini-ex.
- Handwork
 - Digging around and to sensitive underground utility lines, irrigation mains, irrigation lines (if being saved)
- Surveying
 - Final laser surveying of entire swale system
 - Flags + flour outlines
 - Start surveying back from Culvert 3 intake to find bottom of RD1 discharge etc.
 - Animal Shelter and Barn Driveway grading locations flagged

- Materials Delivery & Pre-Positioning
 - Roadbase
 - Straw bales
 - Rock

Day 2 (Thursday 2/4/21)

- Excavator
 - Northwest Vineyard Swale
 - Rolling Dip 1 Sediment Trap
 - West Olive Swale
- Skip Loader
 - Rolling Dip 1
 - Rolling Dip 2
- Handwork
 - Berm Shaping
 - Rolling Dip Shaping
 - RD1 Sediment Trap Shaping and geo-armoring
 - Culvert 3 Inlet Sill

Day 3 (Friday 2/5/21)

- Excavator
 - East Olive Top Swale
 - East Olive Middle Swale (halfway done)
- Skip Loader
 - Animal Shelter Loop
 - Barn Driveway Addition
- Handwork
 - Berm Shaping
 - Culvert 3 Inlet Sill & Discharge Basin

Day 4 (Saturday 2/6/21)

- Excavator
 - East Olive Middle Swale (finished)
 - East Olive Bottom Swale
- Handwork
 - Berm Shaping
 - RD2 Rundown + Media Luna
 - Carancho Run-On Pick-Up

Day 5 (Sunday 2/7/21)

- Excavator - finishing touches
- Handwork
 - Berm shaping
 - Straw Bale Pre-Positioning
 - Seeding - Raking - Mulching (in sections to cover seed immediately)

Machinery / Tools / Materials

Machinery

- Excavator
 - For swales, tree removal, rock placement, potential trenching
 - Buckets: 6-12" trenching bucket (teeth), 12-18" general purpose bucket (teeth), 24-36" general purpose bucket, 24-36" grading bucket (no teeth)
- Skip Loader
 - For rolling dips, [barn teardrop driveway addition](#) and [Animal Shelter driveway loop](#) addition.
- Skidsteer?

Tools

- Landscape rakes x2 (for finishing berms, raking in seed)
- Laser
- Grade Level
- Clinometer
- Shovels, picks, rogue hoes, masonry hoe, pulaski, mattock, trenching shovel
- Magnetic laser receiver for excavator?
- Wheelbarrows or Landscape cart

Materials

- Flour for marking cut lines - (1) large Costco sack + bottomless bottle for application (if scraping and piling for swale berm formation?)
- [Cover Crop Seed](#)
- [Straw mulch](#)
- Culvert sections for driveway additions
 - New Barn Driveway ~ 20'
 - Animal Shelter Loop ~ 20'
- Road base for rolling dips

- Sandbags
 - Enough for 15' linear feet of collection run ~ 60 bags

Cover Crop Seed

All earth disturbed by the tractors or without ample vegetative cover should be heavily seeded with cover crop immediately following disturbance.

- Swale Berm ~ 9,000 sq. ft. = .21 acres
 - Island Seed & Feed Cover Crop
 - Yarrow
 - Pigeon Pea (stick seeds in ground once rains begin and soil moisture is up)
 - CA Poppy
- Swale Ditch Bottom ~ 5,200 sq. ft. = .12 acres
 - Island Seed & Feed Cover Crop
 - Yarrow
 - Daikon Radish
 - CA Poppy
- Tractor Disturbed Area Below Berm ~ 16,400 sqft = .38 acres
 - Immigrant Forage Kochia
 - Yarrow
 - Dryland Pasture Mix

Seed Order

Disturbed area to be covered: $1,487 \times 21 = 31,227$ sq. ft.

Seed calculations [HERE](#).

Mulch Needs

Straw mulch will be the quickest and easiest to distribute across the landscape. Mulching Needs assumes 1 bale of straw per 20'x20' area (400 sqft) for adequately deep straw mulch to protect cover crop seeds from excessive bird predation until germination and establishment.

Sourcing Potentials:

https://www.yelp.com/search?find_desc=Hay+Bales&find_loc=Temecula%2C+CA

[Dan's Feed & Seed](#) - in Temecula

Carries straw bales for horse bedding.

- \$9.25 / bale, no delivery fee with 80 bales, total \$ 804.75
- Might not have that much in stock, didn't know when next delivery was going to be
 - UPDATE: They are getting a new delivery on Thursday 2/5/21

[Kahoot's](#) - in Murrieta

- \$9.49/bale, 150 on hand, don't deliver
- Could ask if Dan's driver would be will to add to pick up if extra bales needed?

Cory Shallow

- Has hundreds of bales, selling for \$6 apiece, can haul over in 2 trips with his set up
- $80 \times \$6 = \480 , saves us \$320 over Dan's prices

Elements	Dimensions			Element Specific Estimate Notes	Material Type	Material Estimate (yds)	Est. Material Cost	Est. Person Hours To Complete	Est. Labor Cost	Equipment Required	Tally
	Length (ft)	Width (ft)	Area (sq. ft.)								
22						118	\$3,220.45	97.75	\$8,797.50		\$12,017.95
Northwest Vineyard Swale	146	10	1460	~ 2.5 hours of excavator work once all preparatory work is completed - trellis removal, utility line ID etc, and ~1.5 hours finishing handwork (ACTUAL: 8-10 hours?all trellising to be kept, irrigation preserved - NOTE always add additional flags at regular intervals - don't assume grades - laser receiver on the ex boom would have help here too)				2.5	\$225.00	Hand Tools,Mini Excavator	<input checked="" type="checkbox"/>
Rolling Dip 1	30			~ 3.5 hours, 1 operator on the skip loader (ACTUAL: this was about correct, maybe ~ 4 with finishing handwork and bottom grading)	Road Base	13	\$650.00	3	\$270.00	Skip Loader w/ Gannon Box,Hand Tools	<input checked="" type="checkbox"/>
Rolling Dip 1 Sediment Trap				1 hour digging, 1 hour armoring, (ACTUAL: ~ 8 man hours between Cory, Casey and Kailey for the dissipation pool - larger than anticipated)	Sharp Rock - Small (6-12"+)	0.5	\$45.63	2	\$180.00	Mini Excavator,Hand Tools	<input checked="" type="checkbox"/>
West Olive Swale	280	11	3080	~ 4 hours of digging w/ mini-ex, 1 hour of spillway finalization and grading, 3 hours finishing handwork. (ACTUAL: sill armoring took Cory and Casey 4 hours + Kailey's help + Wes's help at the very end ~8 man hours, 40% of swale had to have a second pass with the Excavator - get the magnetic boom laser receiver and always laser before doing any hand work or cleaning!)				8	\$720.00	Mini Excavator,Hand Tools	<input checked="" type="checkbox"/>
East Olive Top Swale	267	11	2937	~ 5 hours digging w/ mini-ex, 1 hour spillway, 3 hours finishing handwork				6	\$540.00	Hand Tools,Mini Excavator	<input checked="" type="checkbox"/>
East Olive Middle Swale	291	11	3201	~ 4.25 hours digging w/ mini-ex, 1 hour spillway, 3 hours handwork to finish				8.25	\$742.50	Mini Excavator,Hand Tools	<input checked="" type="checkbox"/>
East Olive Bottom Swale	163	11	1793	~ 2.5 hours of digging w/ mini-ex, 2 hours finishing work by hand (ACTUAL: Spillway alone took ~4 man hours to create, berm hasn'te even been raked - make all spillways their own time estimates!)				4.5	\$405.00	Hand Tools,Mini Excavator	<input checked="" type="checkbox"/>
Rolling Dip 2	35			~ 3.5 hours 1 operator on the skip loader (ACTUAL: took 2.5 hours tops, Casey solo, handwork and machine - very slow going due to tight spaces)	Road Base	13	\$650.00	3	\$270.00	Skip Loader w/ Gannon Box,Hand Tools	<input checked="" type="checkbox"/>
Rolling Dip 2 Rundown	NA	NA	135	~ 1 cubic foot per yard equating to 1 square foot of ground covered, plus additional material for dissipation pool and media luna, (ACTUAL: took approximately 5 man hours to complete armoring and splash basin)	Sharp Rock - Large (1-1.5')	6	\$564.66	6	\$540.00	Hand Tools	<input checked="" type="checkbox"/>
Culvert 3 Entry Sill	NA	6	24	~ 1.5 yards of Large sharp rock (ACTUAL: took approximately 8 man hours to complete with 2-3 people working)	Sharp Rock - Large (1-1.5')	1.5	\$141.17	6	\$540.00	Mini Excavator,Hand Tools	<input checked="" type="checkbox"/>
Culvert 3 Discharge Basin	NA		20	~ 1 yard of small sharp rock, most of which can be re-purposed from existing rock base	Sharp Rock - Small (6-12"+)	1	\$91.25	2	\$180.00	Hand Tools,Mini Excavator	<input checked="" type="checkbox"/>
East Olive Top Swale East Drain	88			~ 2 excavator hours, 1 hour to hand finish (ACTUAL: rock impeded machine or hand tool work, will be linked via flexible pipe to rain tank overflow pipe)				3	\$270.00	Mini Excavator,Hand Tools	<input checked="" type="checkbox"/>
East Olive Middle Swale East Drain	85			~ 1.25 excavator hours, 1 hour finishing handwork (ACTUAL: didn't happen)				2.25	\$202.50	Mini Excavator,Hand Tools	<input checked="" type="checkbox"/>
East Olive Bottom Swale East Drain	55			~ .75 excavator hours, ~ 1 hour finishing handwork (ACTUAL: cut with ex prior to skip working on RD2, should have just waited -also work from the bottom of the system to the top!)				1.75	\$157.50	Hand Tools,Mini Excavator	<input checked="" type="checkbox"/>
East Olive Bottom Swale West Drain	35			~ .5 hours excavator, .5 hours finishing handwork (ACTUAL: see above)				1	\$90.00	Hand Tools,Mini Excavator	<input checked="" type="checkbox"/>
Rolling Dip 2 Entry Drain	50			~ .5 hours on excavator, 1 hour finishing handwork (ACTUAL: guessing 6-7 man hours)				1	\$90.00	Mini Excavator, Hand Tools	<input checked="" type="checkbox"/>
Carancho Run-On Pick-Up	27	5	135	~ 6 hours handwork digging, armoring sides, bucket testing with sandbags (actual ~ 3 hours to complete)	Sharp Rock - Small (6-12"+)	3	\$273.75	6	\$540.00	Hand Tools	<input checked="" type="checkbox"/>
Spreading & Raking Seed			24087	~ 2500 square feet an hour (125 linear feet by 20 feet wide) per person				10	\$900.00	Hand Tools	<input checked="" type="checkbox"/>

Seed / Mix	Recommended Seeding Density	Sourcing	Application Areas	Total Area Of Application (sqft)	Total Area Of Application (acres)	Amt. Required for 100% Density	Cost / Unit	Total Cost / Item	Total Cost
									\$927.25
Island Seed & Feed Cover Crop	approximately 4 lbs / 100 sq ft	https://islandseed.com	Swale Berm, Swale Ditch	14,200	0.33	60	\$2.75	\$165.00	<input checked="" type="checkbox"/>
White Yarrow	.5 lbs / acre	https://greatlakesseed.com	Below Berm, Swale Mound, Swale Ditch	30,600	0.70	1	\$39.95	\$39.95	<input checked="" type="checkbox"/>
Pigeon Pea	2 seeds / hole every 5', 1,200 linear feet of berm with seeds placed on top	https://www.pigeonpea.com	Swale Berm		0.00	10	\$2.50	\$25.00	<input checked="" type="checkbox"/>
CA Poppy	No recommended density	http://www.sagebrushseed.com	Swale Berm, Swale Ditch	14,200	0.33	1	\$36.00	\$36.00	<input type="checkbox"/>
Dryland Pasture Mix	20 lbs / acre broadcast	https://greatlakesseed.com	Below Berm	16,400	0.38	10	\$3.85	\$38.50	<input checked="" type="checkbox"/>
Immigrant Forage Kochia	4 lbs / acre	https://greatlakesseed.com	Below Berm	16,400	0.38	3	\$19.95	\$59.85	<input checked="" type="checkbox"/>
Daikon Radish	10 - 15 lbs / acre, comes in minimum 5 lbs	https://hanceseed.com	Swale Ditch	5,200	0.12	1	\$18.95	\$18.95	<input checked="" type="checkbox"/>
Straw Bales	assumes ~ 300 sq ft / bale, have seen calculations ranging from 250 sq ft to 800 sq ft per bale for coverage	http://www.drylandseed.com	Swale Berm, Below Berm	25,400	0.58	80	\$6.00	\$480.00	<input checked="" type="checkbox"/>
Straw Delivery Charge								\$100.00	<input checked="" type="checkbox"/>

Priority	Installation Name	Equipment Needs / Installation				
		Skip Loader w/ Gannon Box	Mini-Ex	Water Trailer	Ranch Tractor	Handwork
1	Northwest Vineyard Swale	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Rolling Dip 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.1	Rolling Dip 1 Sediment Trap	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.2	West Olive Swale	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Culvert 3 Entry Sill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Culvert 3 Discharge Basin	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	East Olive Top Swale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	East Olive Top Swale East Drain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	East Olive Middle Swale East Drain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	East Olive Middle Swale	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	East Olive Bottom Swale West Drain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	East Olive Bottom Swale	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	East Olive Bottom Swale East Drain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Rolling Dip 2 Entry Drain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Rolling Dip 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Rolling Dip 2 Rundown	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Carancho Run-On Pick-Up	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Animal Shelter Loop Addition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Animal Shelter Pad	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Barn Driveway Loop Addition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Spreading & Raking Seed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Straw Mulching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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