RAINWATER CONSERVATION SYSTEMS BY
COLE DESIGN MONTECITO

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County of Santa Barbara

Greetings County Officials and Park Directors...

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WATER SAVINGS FOR COUNTY PARKS

I am Monty Cole a builder/designer and patented inventor. I have 35 years experience in designing and building commercial drainage and pump system for apartments, roadways and even an airport. My company designs and installs rainwater catchment systems for estates, government and businesses in Santa Barbara County.

We recently designed a water catchment system for *Lotusland, which gathers and stores* rainwater in underground cisterns, over 2,700,000 gallons per year at roughly *1/10 cent a gallon*. We are using Lotusland parking lots, driveways and channels to collect water each rain and store it.

I have created a survey for Maria Ignacio Creek using stormwater from some 5.51 square miles of drainage area according to USFW, including several hundred homes, miles of streets and driveways. Here are my findings.

SITE RAINWATER AMOUNTS AND CALCULATIONS

This project uses rainwater runoff that gathers at Maria Ignacio Creek and San Antonio creek, at the confluence of these two streams as it passes under highway 101 and the railroad trestle. The watershed flows from highway 101 north/east to the top of highway 154 flows into these two creeks.
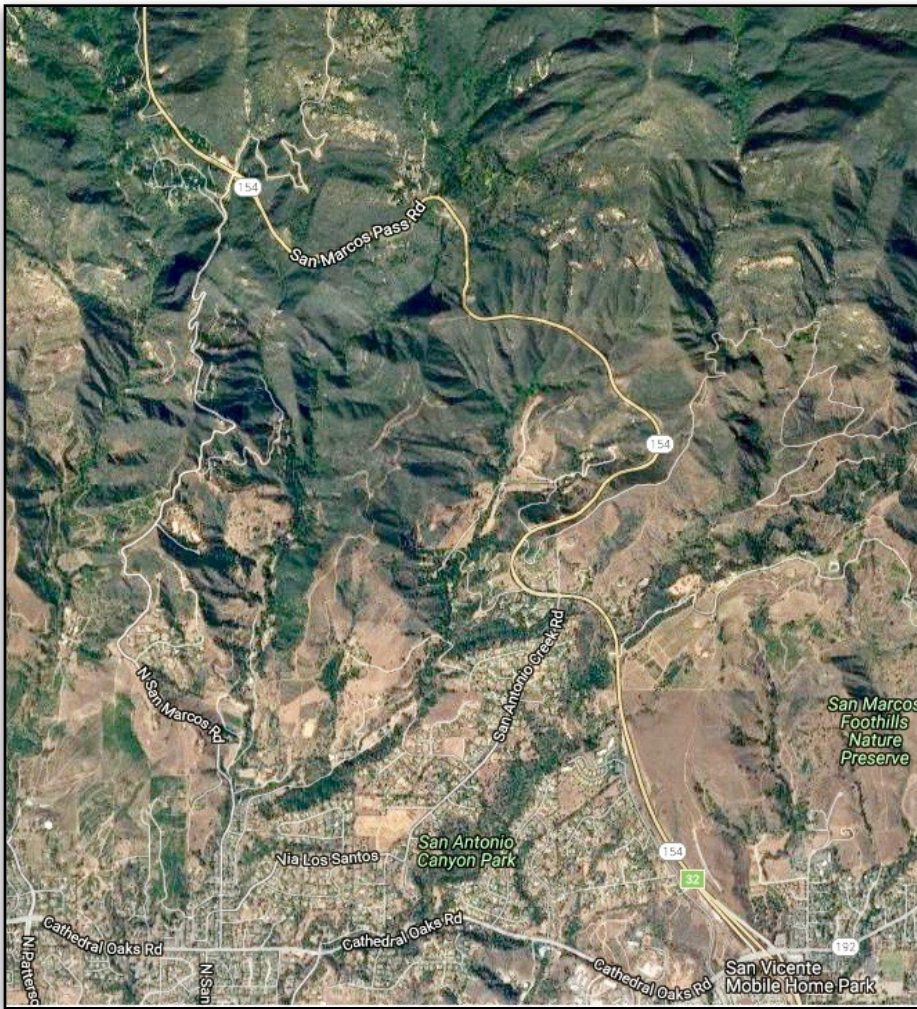
From USGS DESCRIPTION: Maria....change this out Goleta, CA Latitude 34°27'33", Longitude 119°48'29" NAD27 Santa Barbara County, California, Hydrologic Unit 18060013 Drainage area: 5.51 square milesDatum of gage: 95.61 feet above N

My design here involves installing a fish ladder and stormwater capture design at this railroad trestle, where fish are prevented from climbing upstream by a 7' drop. We plan to capture and collect floodwaters and store them at a nearby open area along San Antonio creek and use this water later to irrigate parks along the watershed and keep the riparian habitat enhanced with water.

THE NUMBERS

Maria Ignacio creek drains 5.51 square miles. USGS records go back 68 years on this creek to 1948. Collecting the average flow for the last 68 years for the month of January indicates an average flow of 6.5 CFS. This creates a January average of 403 acre feet over 31 days, or 13.4 AF per day January average.

A 68 year average from the USGS chart of December, January, February, March and April creates water flow out of Maria Ignacio creek of 1,810 acre feet.That's 589,790,310 gallons 68 year average per these five months.

8" Pipe from Pump Station - 380' Pipe installed adjacent bike path fence to storage cisterns (under 101 and RR Trestle)
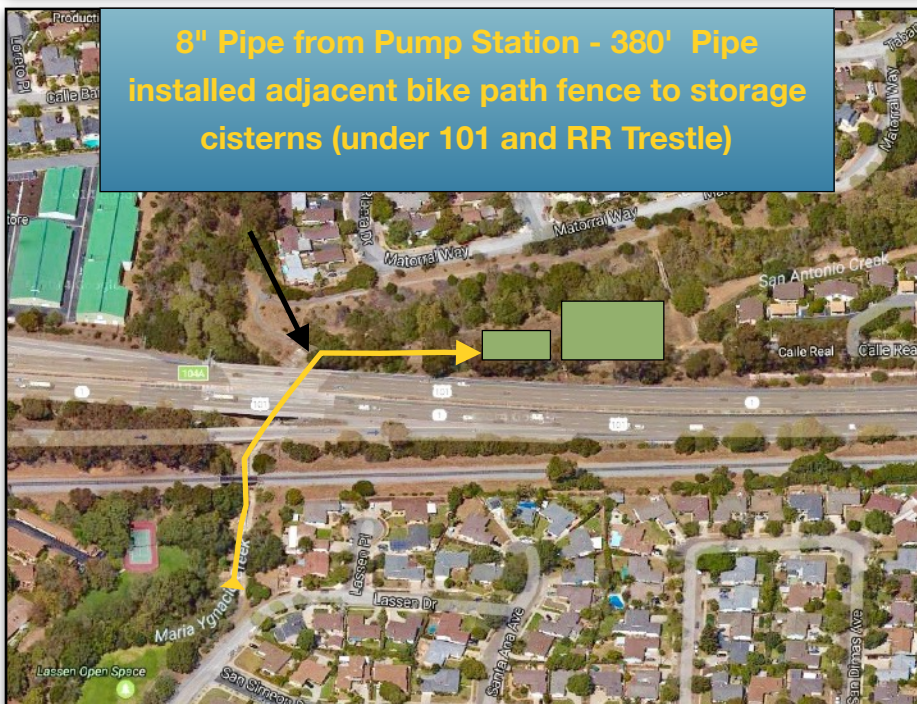
For the other 7 non-rainy   months the 68 year combined average yearly flow is 274.75 acre feet, creating a total yearly 68 year average of 2,084.74 acre feet.

So if we extract and store 20% of this water during the five rainy months we have 362 acre feet to utilize each year. The only real limit is how many acre feet is built in water storage.

THE DESIGN

Here's an overview of the design... At the existing RR trestle instal a new fish ladder along the East side of the creek, along and below the existing bike path. The ladder carries water from the upriver edge of the trestle construction to a spot 225 feet downstream, on the East side of the creek. At this spot instal a berm to deflect creek and protect pump station, and behind this berm construct a concrete sump and pump platform. The sump is 10' x 10' by 8' deep...thus 800 cubic feet or 5,984 gallons of storage. On the top of this storage sump are instal an electric pump shown here. This trash pump will move 2,800 GPM, or 168,000 GPH or 4,032,000 per day. That is 12 acre feet per day, depending on actual river flow. The sump will gather water from the 12" inlet pipe from the cube. The pump(s) will remove this runoff water and send it up stream in an 8" pipe placed along the bike path, (outside the fence) to the new storage areas. New storage is created North/East of the Highway 101 crossings in the empty fields along side Maria Yngacio creek.

Fish Ladder   240' Length Elevation Gain 80"

Cube 16" X 16" X 6 ft - Attached to (n) concrete slab installed across

← **Creek Bed** →

North

Maria Yngacio Creek

• **Pump Station 2700 GPM**

• **Collection Sump**

• **8" Inlet/outlet**

• **12" Cube outlet pipe**

• **Gravity flows to Pump Station**

• **Bolted to side of berm**

8" outlet pipe from pump station follows outside edge of fence 380' To storage cistern

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TFCC-8™ Series

▶ **VIEW BROCHURE**

• Fluid handling capabilities up to 2700 GPM
• Head capabilities up to 120 ft.
• Designed for high volume wastewater treatment and industrial fluid handling

Municipal or Industrial Trash Pumps
Pump up to 2800 GPM

Thus when the Maria Yngacio River flows at 7' per second, two cubes will gather 4,716 GPM at a maximum. Water is stored in sump, and pumped out to the storage cisterns, gathering 3-6 acre feet per day of big flows in the river. Send this stored water up the water channels in 8" pipes to irrigate the parks and farms along this creek all the way up to Tuckers Grove, saving millions of gallons per year.

Also send this water to spreading planes through out Goleta for groundwater recharging.

THE CUBE

This is my *patented device* that safely and efficiently collects water from a rushing channel. These cubes are six feet long and 16" square tubes that allows rushing water to pass straight through when open. When they are closed via a steel cable from above on a bridge or abutment, water entering the cube is redirected to a steel pipe exiting out the side of the cube, where water is carried away along the channel in pipes installed on the concrete channel walls. The cube thus pulls and extracts water out of the channel on command and sends water to storage.

The capture rates are shown here. When securely installed in the water channel, @ 7fps flow rate in the creek, (2) cubes gather 78.6 gallons per second as an average...
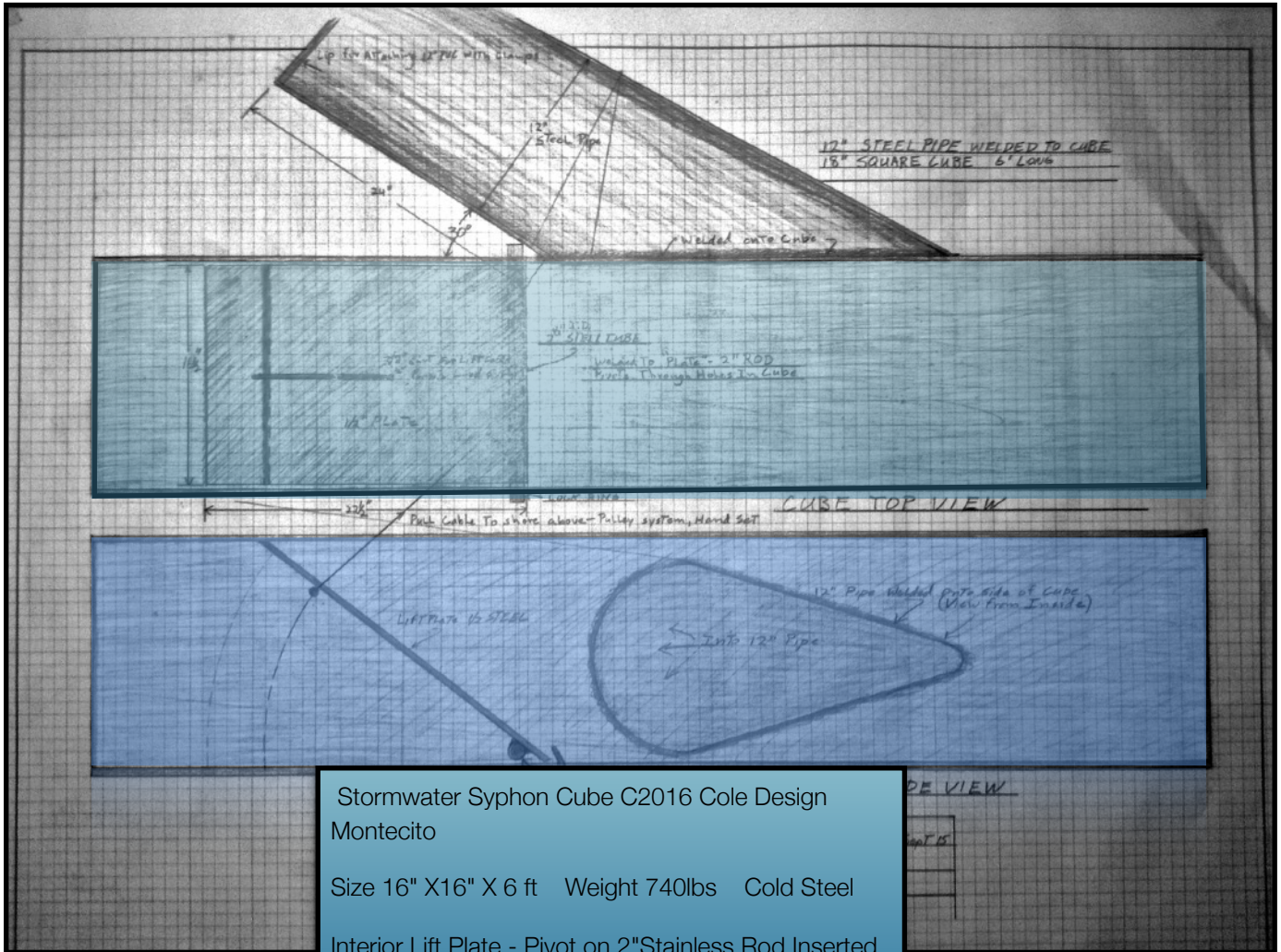
Stormwater Syphon Cube C2016 Cole Design Montecito

Size 16" X16" X 6 ft   Weight 740lbs   Cold Steel

Interior Lift Plate - Pivot on 2"Stainless Rod Inserted Through Cube

(Fig 1) Cube Capture Rates for 7fps Stream Flow

@ 14"water height 16"X16" X 6'   (2) Cubes

78.6 GPS Gallons Per Second

4,716 GPM   Gallons Per Minute

282,960 GPH   Gallons Per Hour

6,791,040 GPD Gallons Per Day

24 Hour Rate / 325,851 = 20.8 Acre Feet

groundwater recharging.

Or

4,716 Gallons Per Minute GPM

282,960 Gallons Per Hour GPH

6,791,040 Gallons Per Day GPD (24 Hour Rate)

STORAGE

At the open field along side of Maria Yngacio Creek construct (2) storage cisterns, 50' x 100' x16' = 80,000 cubic feet, and 75' x 100' x 16 = 120,000 cubic feet. ..Thus 200,000 cubic feet and 1,496,000 gallons or 4.59 acre feet of storage. Fill and empty this storage 30 times a year and it's 138 AF year and a start to water savings and
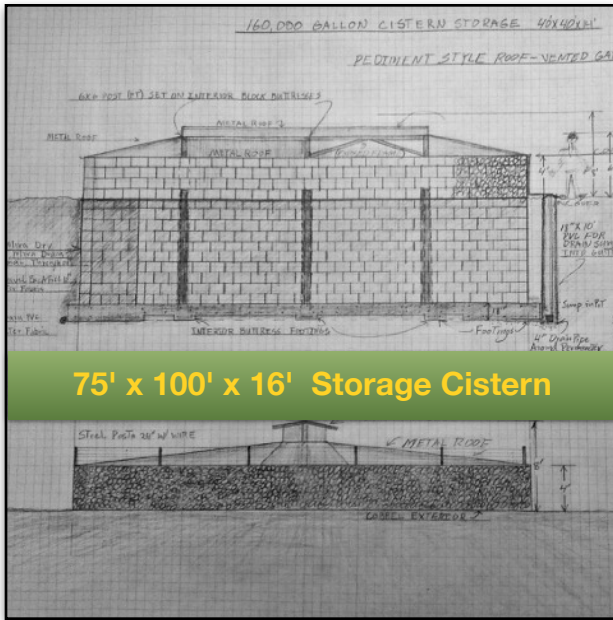
75' x 100' x 16' Storage Cistern

Water can be pumped from storage cisterns at 101, up the stream banks via 8" pipes laid in along the upper baks of Maria Ignacio. This way there's no need to instal pipes in roadways and right of way is already established. Send water up or down the pipe system as needed. Install additional storage at Tuckers Grove as needed.

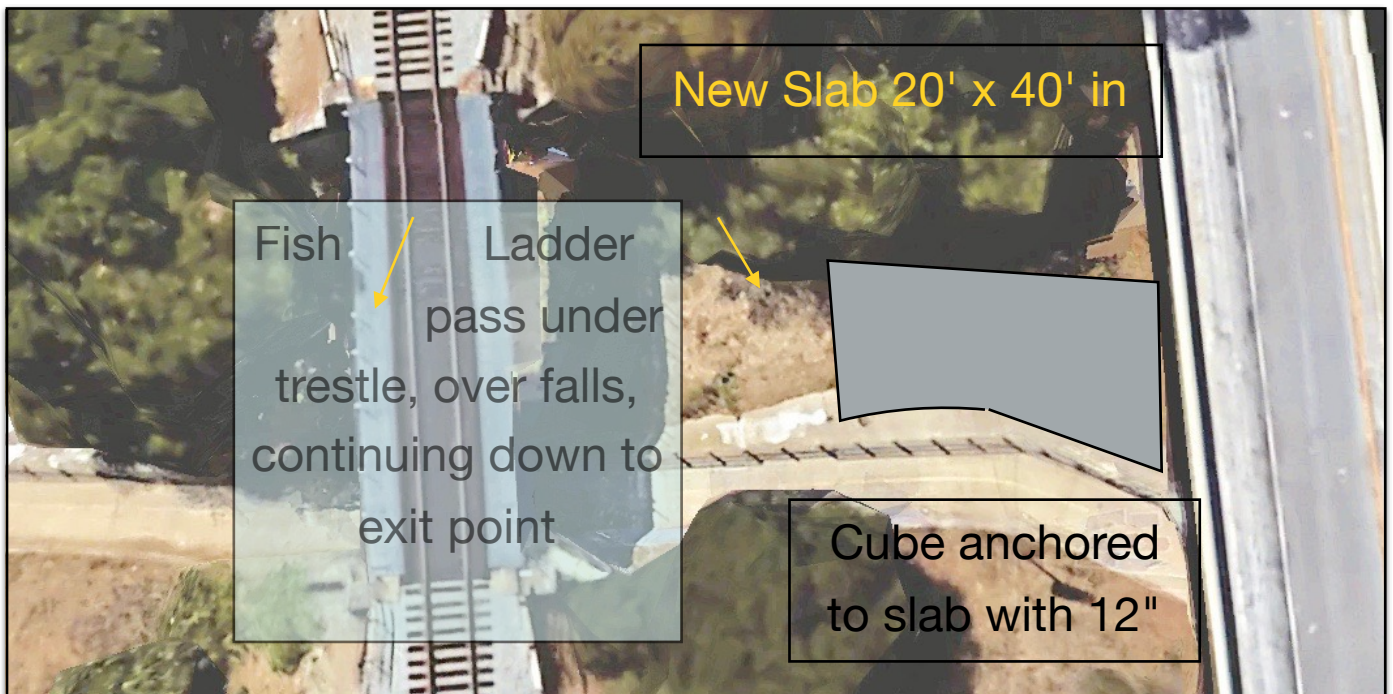## RETAIL WATER - $638,667 IN YEARLY WATER SAVINGS

This water is only creek runoff, it can't be used in houses but can be used in park irrigation, farm irrigation and spread out to re charge groundwater. Considering that the parks and farms along this creek use approximately 140 acre feet a year, the equation is... 140 x 325,851 = 45,619,140 gallons of pumped
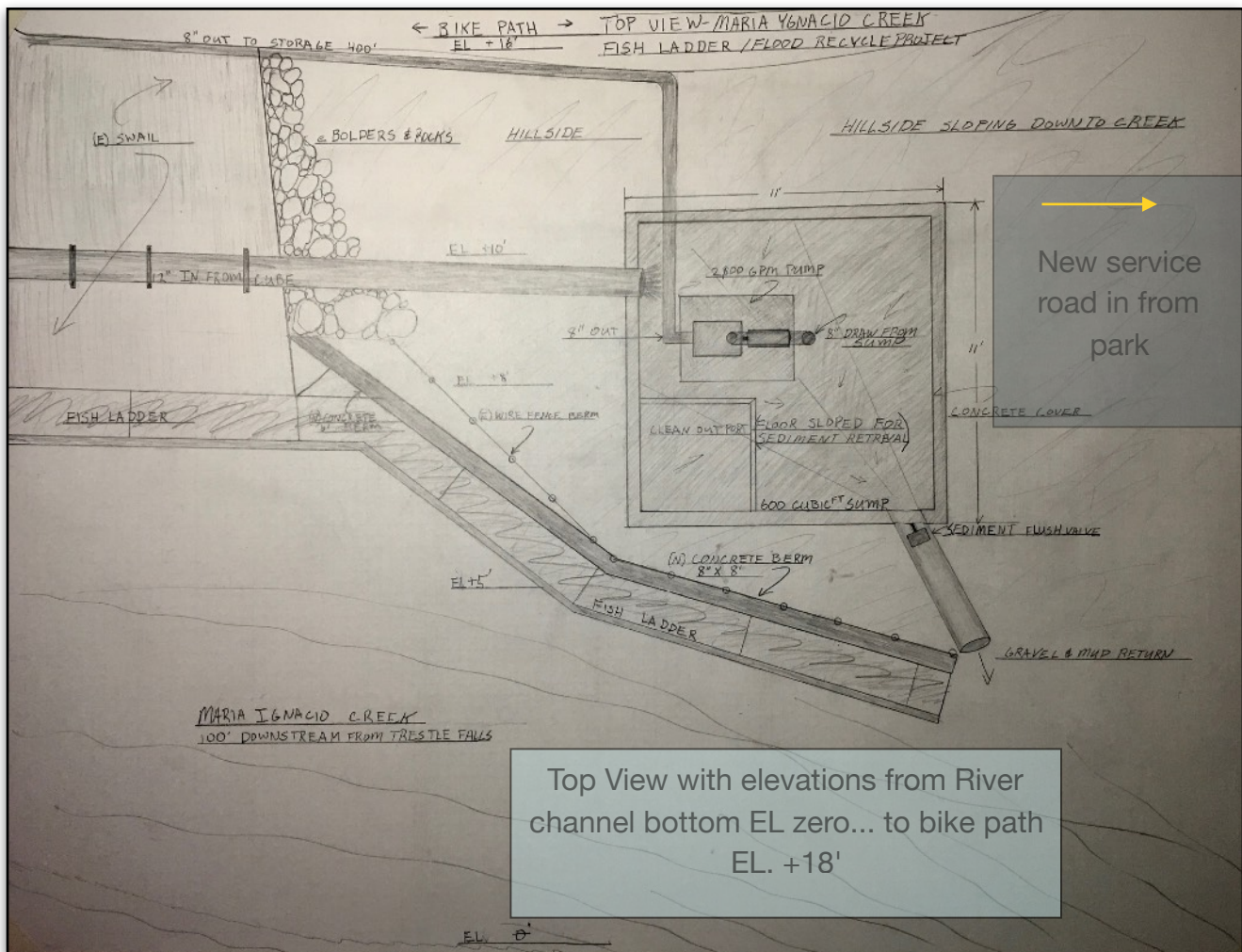

Side View looking east through
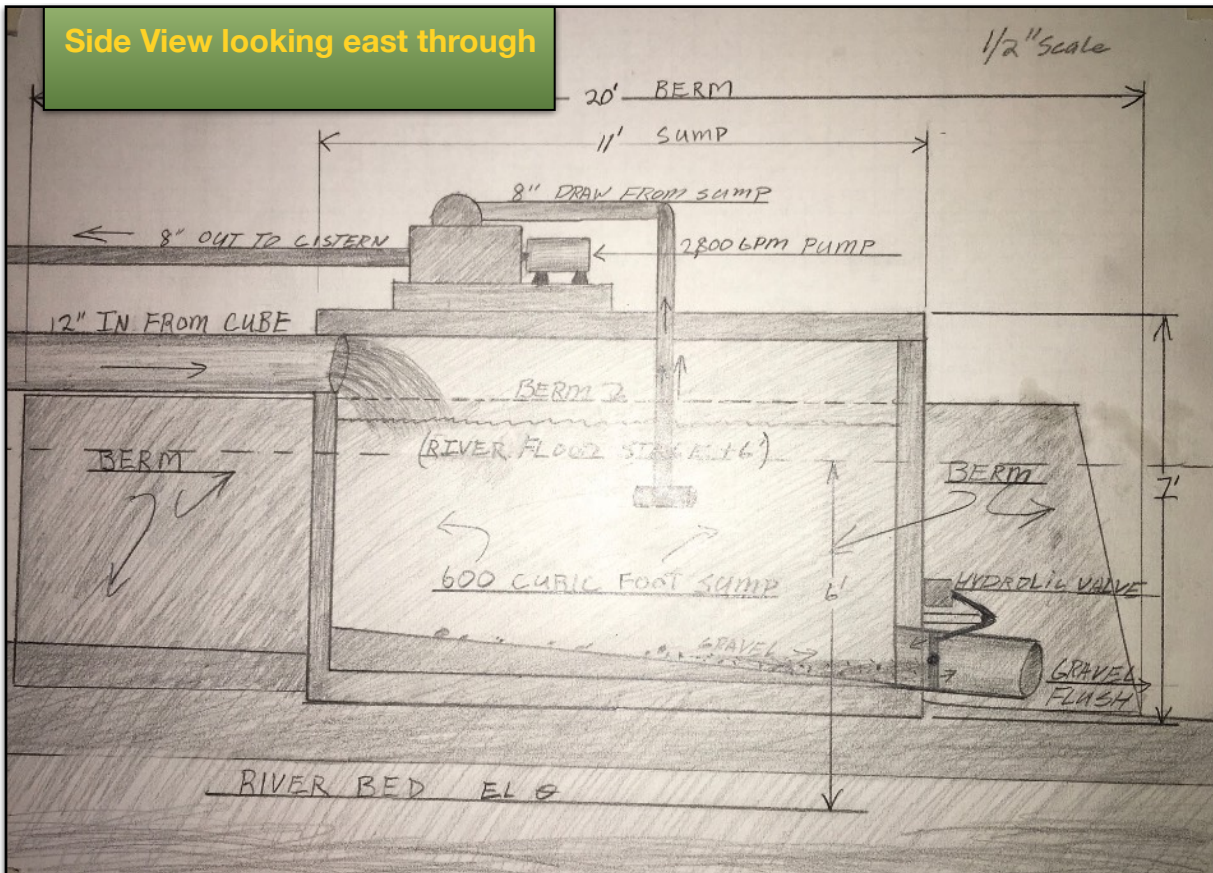
in chlorinated water.... x .014 or 1.4 cents a gallon average = $638,667.96 dollars saved by using this system. And that's *every year*, excluding electric and maintenance for the sumps and pumps. That's all water that doesn't need to be sent for norther CA using hundreds of pumps, megawatts of electricity and creating tons of deadly CO_2.

Suggest we copy this existing fish ladder design at Olive Mill Road. This will work for the Maria Ignacio RR Trestle fish ladder/ Storage project. Also this will help gauge the costs for a similar project. Imagine this fish ladder running along the bike path and under the RR trestle, at Maria Ignacio Creek. Water from the cube would be in a 12" pipe running just to the right of the pictured ladder.

New Slab 20' x 40' in

Fish   Ladder
pass under
trestle, over falls,
continuing down to
exit point

Cube anchored
to slab with 12"

Top View with elevations from River channel bottom EL zero... to bike path EL. +18'

CONCLUSIONS

With this system the County can begin to open up nearly 6 miles of Steelhead habitat previously off limits due to the RR falls barrier. And now there is available each year 200 - 300 acre feet of run off water, for park irrigation, farms irrigation, groundwater recharging, wildlife habitat enhancement... All this for probably around 2.3 million one time cost. Government grants are available in the hundreds of millions of dollars... Grants here-

www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/prop1/

This project saves the county nearly $600,00 a year, each year in water costs. And the project saves and enhances Steelhead and riparian habitat. It's a win-win for taxpayers, government and wildlife. Governments and NGO's must act by applying for these grants now. Proposal deadlines are always pending and time scales are 18 months + . Waiting for a perfect design... is a formula for failure. A practical and simple design formula will yield good results... ie lots of water for little taxpayers money.

I offer these plans as a concerned citizen. My calculations are based on 68 years of USGS numbers. My stake in the cube is such that I believe the cube is the best and only efficient, safe method for economically retrieving storm runoff water from creeks, without dams, weirs or major diversions. Thus *its use will make these projects possible and economically feasible*. I intend to lease out the cube

device. The cube device is the only feasible method to extract stormwater on command from a creek, without building a dam and storm runoff channels.

AVAILABLE WATER

The chart below contains a summary of USGS water amounts from Mari Ignacio creek. The USGS chart shows the CFS amounts per month, over a 68 year period. We have multiplied these daily amounts to reflect monthly average water flows. Converting to acre feet to show the great amounts of water flowing per month out of these creeks. From January to April the 68 year average water output is 1,810 acre feet. So by harvesting just 20% form this period creates 362 acre feet of saved water. Placing it back into parks, farms, wildlife riparian habitat enhancement and groundwater recharging completely recycles this water.

GRANTS AVAILABLE

$8 billion in grants from CA are available for all these projects. Only governments can apply, so please apply at...

http://www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/prop1/

http://cosb.countyofsb.org/irwmp/irwmp.aspx?id=42010

Best Regards, Monty Cole

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Maria Yngnacio Creek Summary from USGS Monthly Stats
1948-2016 Averages   68 yr Averages

Jan average from 1948-2016 =   6.5 CFS = 13AF/Day X31= 403 AF/m.

Dec. 2.7 CFS = 5.4 AF Day (Dec) X31 = 167.4 AF month

Feb. 11 CFS = 22 AF Day Feb. X29 = 638 AF/Mo

March 7.1 CFS = 14.2 AF Day March X31   440.2 Af/mo

April 2.7 CFS = 5.4 AF Day April X30   162 Af/mo
                                        5mo   1810 AF

May .89 = 1.8 AF Day May 31   55.8 Af/mo

June .36 = .72 AF/Day June 30   216 Af/mo

July .21 = .42 AF/Day July 31   13 Af/mo

Aug .15 = .3 AF/Day Aug 31   93 Af/mo

Sept .14 = .28 AF/Day Sept 30   8.4 Af/mo

Oct .32 = .64 AF/Day Oct 31   19.84 AFmo

Nov. .94 = 1.88 Af/Day Nov 30   56.4 Af/mo
         53.04   7mo   274.75 AE
                               12 mo 2084.74 AF/yr

Jan 6.5 CFS X 7.48 = 48.6 GPS X 60 = 2,917 GPm
                              seconds
   X 60 = 175,032 GPH X 24 = 4,200,768 GPDay
     min   hrs
   = 12.9 AF/Day in January average 1948-2016
   Jan 6.5 CFS = 12.9 AF Day so
   $\frac{6.5}{12.9}$ × $\frac{50.3\%}{100}$ Thus—1 CFS = 2 AF Per Day—

Slot in Channel for Fish ladder

Fish Ladder entrance

Slot Channel exiting
into Fish Ladder

Fish Ladder

Creek Flow

Creek Channel

Imagine

Bike

Path

Here

Fish

Ladder

Channel Slot
with Fish Ladder

in distance-
Looking
downstream

Maria Ignacio Creek at proposed Sump Station and end of Fish Ladder location

Maria Ignacio Creek at RR Trestle Falls