TWO STREAM LOAD CROSSINGS

BEAR CANYON Proposal (A)

MT. BALDY HOA
TWO STREAM CROSSINGS

TWO OPTIONS: WORSE CASE = 1000 CFS & 650 CFS	Three Culverts/Crossing = 1000 CFS				Two Culverts/Crossing = 650 CFS		
Design Services:	**Units**	Quantity	Unit Price	Totals			
1 Design, Plans & Specifications	LS		$10,000				
2 Surveying	LS		$2,000				
3 Geotechical	LS		$1,000				
4 Structural	LS		$5,000				
5 Environmental if required	LS		$0				
6 Permitts - LA County	LS		$3,000				
7 Total Design Costs	LS		$21,000	$21,000			$21,000
LS = Lump Sum							
Total Construction Costs							
1 Pre-Cast Concrete Culverts - (8' W x 3' H x 8' laying Length)	EA	12	$7,000	$84,000	8	$7,000	$56,000
2 Stream Bypass Pipeline- (12" HDPE DR 9)	LF	200	$40	$8,000	200	$40	$8,000
3 Excuvation & Equipment	LS	$15,000	$15,000	$15,000	$12,000	$12,000	$12,000
4 Concrete Footing w Reinforcing	Cu Yds	40	$120	$4,800	25	$120	$3,000
5 Concrete Pumper Cost	LS	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500
6 Rock Bedding 6" thick	Tons	140	$30	$4,200	130	$30	$3,900
7 AC Road Top and Side Rails (40' *16' * .333')	Cu Ft	430	$15	$6,450	430	$15	$6,450
8 Rip Rap & Filter Fabric (Time to collect and transport Large Rocks)	LS	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
9 Construction Cost = Labor				$45,000			$45,000
Crossing Costs				$173,950			$140,850
Contingency of 15%				$26,093			$21,127.50
Total Construction Costs for Both Crossings				$200,042.50			$161,977.50
Total Project Costs - Design & Construction				$221,042.50			$182,977.50
Total Project Costs for One Crossing - Design & Construction				$110,521.25			$91,488.75

MT. BALDY HOA
TWO STREAM CROSSINGS

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1 Design, Plans & Specifications			$10,000				
2 Surveying			$2,000				
3 Geotechical			$1,000				
4 Structural			$5,000				
5 Environmental if required			$0				
6 Permitts - LA County			$3,000				
7 Total Design Costs			$21,000	$21,000			$21,000
Total Construction Costs							
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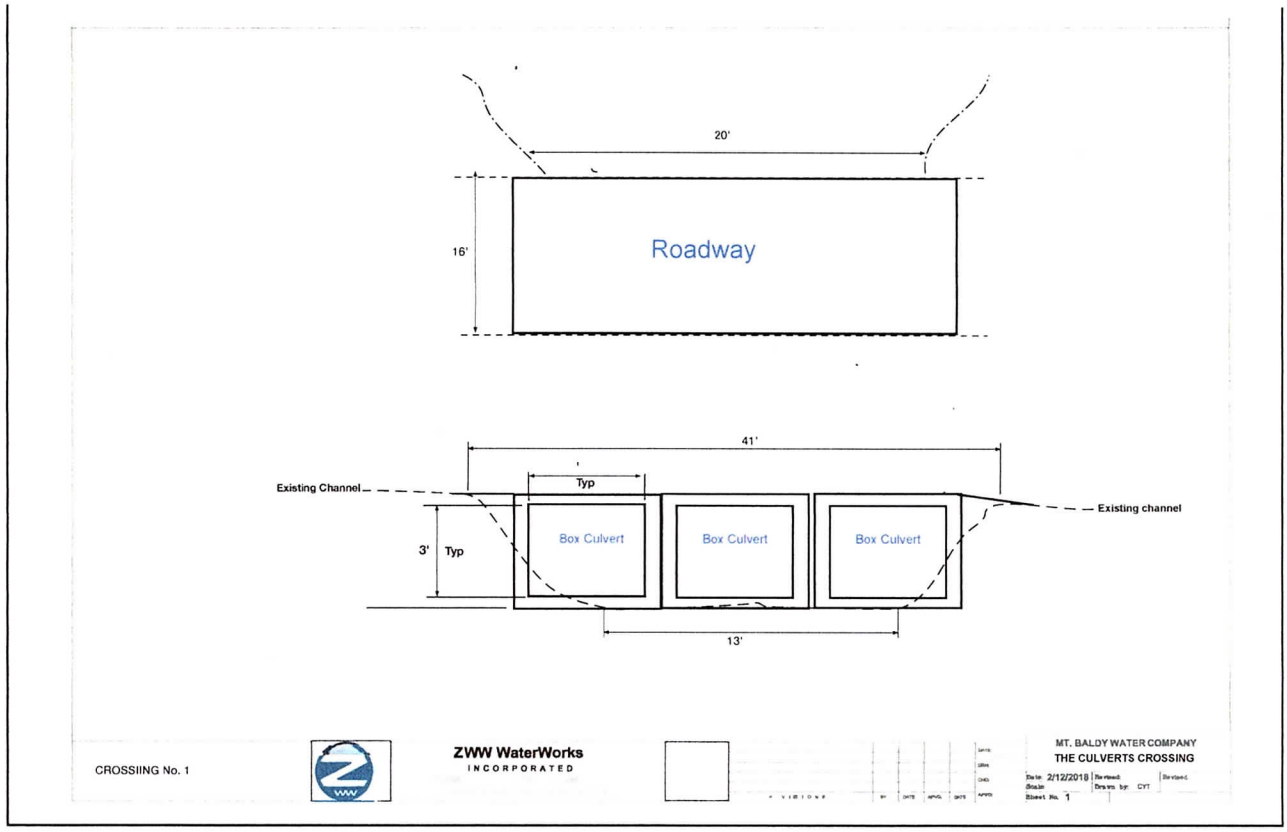
6 Rock Bedding 6" thick	Tons	140	$30	$4,200	130	$30	$3,900
7 AC Road Top and Side Rails (40' *16' * .333')	Cu Ft	$10					
8 Rip Rap & Filter Fabric (Time to collect and transport Large Rocks)	LS	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
9 Construction Cost = Labor				$45,000			$42,000.00
Total Project Costs not excluding Drainage casing/pipe				$167,500			$131,400
TOTAL for Both Crossings **with no contingency**				$188,500.00			$152,400.00
Note:							
Each Crossing would Costs **with no contingency**				**$94,250.00**			**$76,200.00**
Contingency of 15%				$14,137.50			$11,430.00
Each Crossing Costs with 15% Contingency				**$108,387.50**			**$87,630.00**
FOR TWO CROSSING				$216,775.00			$175,260.00

From: RICHARD ZARAGOZA <rzaragoza@zwwinc.com>
Subject: MT. BALDY - 3 Culvert Crossing .pdf
Date: November 16, 2018 12:03:07 PM PST
To: "MT. Balbly WS" <Richard@4000FT.com>

1 Attachment, 366 KB



Precast Concrete Box Culverts

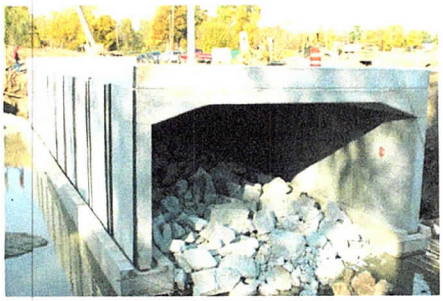
Think Inside the Box...

Precast concrete box culverts are among the most versatile and cost-effective products on the market today, meeting and exceeding the needs of a variety of fast-paced construction projects.

Precast box culverts can serve as:

- underpasses
- tunnels
- subways
- bridges
- stream culverts
- material handling
- storage
- watertight tanks and more

precast makes it possible™



Precast Concrete Box Culverts

Strength

The load-carrying capacity of precast concrete is derived from its own structural qualities and does not rely on the strength or quality of the surrounding backfill materials. In addition, the strength of precast concrete gradually increases over time. Properly designed precast concrete box culverts can easily support vehicular, aircraft and railway loads meeting AASHTO, FAA and AREMA specifications.

Quality

Because precast concrete products are manufactured in a controlled environment, they exhibit high quality and uniformity. Precast concrete box culverts installed with high-quality sealants offer a superior solution to watertightness requirements.

Ease of Installation

Because precast concrete box culverts are manufactured well in advance of installation, they are ready for transportation to the job site at a moment's notice. They are installed in a matter of hours using a crane and a small crew. Backfilling can begin immediately, rather than waiting several days or more for cast-in-place concrete to gain proper strength. Once backfilled, road construction can begin, greatly reducing the deviation of any associated lanes and congestion in the surrounding communities.

Reduced Weather Dependency

With precast concrete, weather will not delay the manufacturing process or significantly affect the schedule. Conversely, forming and placing of concrete for cast-in-place applications can be delayed significantly due to poor weather conditions.

Aesthetically Pleasing

Precast concrete box culverts can also include spandrel and wingwall panels with a variety of finishes and colors. Each is distinctly different, providing specifiers and owners a broad choice in appearance. Architectural finishes complement the surrounding environment.

Environmentally Friendly

Precast concrete is nontoxic, environmentally safe and made from all natural materials, making it an ideal material for use below grade or for the conveyance of water. Concrete has no proven ill effects on groundwater and surface water quality, which helps preserve our natural water resources.

Cost Effectiveness

Incorporating precast concrete box culverts into your next project can save you time and money. Fewer skilled laborers and fewer man-hours will be required for the project, making precast concrete box culverts ideal for meeting the needs of today's fast-paced construction projects.

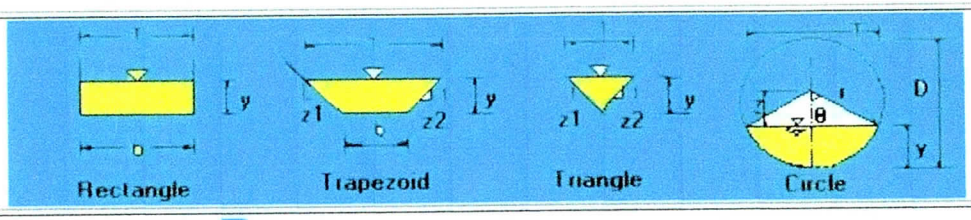
Whether you are spanning a small creek, designing a combined sewer overflow system or housing telecommunications equipment below grade, precast concrete box culverts are the clear choice.

precast makes it possible™

NPCA
Precast... The Concrete Solution

The open channel flow calculator

Select Channel Type: Trapezoid



Channel slope from V

Select unit system: Feet(ft)

Channel slope: 0.10640 ft/ft	Water depth(y): 2.81 ft	Bottom width(b) 13.15 ft
Flow velocity 11.948 ft/s	LeftSlope (Z1): 8 to 1 (H	RightSlope (Z2): 3 to 1 (H
Flow discharge 960.3808 ft^3/s	Input n value 0.06 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 44.69 ft	Flow area 80.38 ft^2	Top width(T) 44.06 ft
Specific energy 5.03 ft	Froude number 1.56	Flow status Supercritical flow
Critical depth 3.51 ft	Critical slope 0.0411 ft/ft	Velocity head 2.22 ft

INFO BRIEF

Rinker MATERIALS

HYDRAULIC CAPACITY OF PRECAST CONCRETE BOXES

The hydraulic capacity of precast concrete box culverts is a key factor in determining the best application for this product. The hydraulic characteristics of boxes are similar to those for circular, arch and elliptical pipe. The Manning Formula is the most widely accepted method for evaluating the hydraulic capacity of non-pressure conduits.

MANNING FORMULA

$$Q = (1.486/n) * A * R^{2/3} * S^{1/2}$$

Q = Discharge, cfs

n = Manning's Roughness Coefficient

A = Cross-Sectional Area of Flow, sf

R = Hydraulic Radius, ft (equals the area of the flow divided by the wetted perimeter)

S = Slope of Conduit, ft/ft

It should be noted that in storm sewer design, for two conduits of similar materials but different shapes to be equal hydraulically, it is necessary for the factor $A * R^{2/3}$ to be equal for both shapes. A hydraulic comparison cannot be made based solely on cross sectional area of the conduit. The hydraulic capacity of the conduit is determined by multiplying this factor by $(1.486/n) * S^{1/2}$ which accounts for the surface roughness and slope. Commonly used n value for precast concrete products is 0.012. When determining the various values used in the Manning Formula, the Engineer must account for the effect of the corner haunches on the cross-sectional area and wetted perimeter.

The American Concrete Pipe Association (ACPA) has a number of Design Data's that cover in detail the hydraulic capacity of precast concrete boxes. These Design Data's cover full flow conditions, partial flow conditions and inlet and outlet control issues. Copies can be obtained from your local Rinker Materials facility.

The attached chart is for various size boxes, assuming 12" haunches, listing the full flow and partial flow (0.7Ht) capacity for a slope of 0.005 Ft/Ft with a Manning's n of 0.012.