



Date: November 16, 2010
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Address: 600 B Street, Suite 800, MS 908A – San Diego, CA 92101
Project: Task Order #19
Subject: Avenida de la Playa Storm Water Alternative Analysis

The flooding problems at Avenida de la Playa have been characterized in the Storm Water Pipe Preliminary Analysis dated October 5, 2010 prepared by Tetra Tech. Flooding at this location results from a combination of factors, including an undersized storm drain system, frequent sand intrusion, and trash clogging at the outfall structure. Three design alternatives, based on varying level-of-service criteria have been developed to reduce the flooding impacts. Each alternative includes two options for the location of the outfall structure. Trash is one of the contributing factors in the reduced performance of the storm drain system and is addressed with the implementation of hydrodynamic separators placed throughout the storm drain system. An opinion of probable construction cost estimate is included to compare the various storm drain system design alternatives.

Alternative Hydraulic Design Criteria

Three storm drain design alternatives have been developed to meet the level-of-service criteria described below.

Alternative 1: Maintain the conveyance capacity of 130 cfs of the existing twin 51-inch diameter pipes currently in Avenida de la Playa.

Alternative 2: Replace the existing twin 51-inch diameter pipe with a larger storm drain system capable of conveying flows that match the current capacity of the upstream 72-inch diameter pipeline. The flow capacity of the 72-inch diameter pipeline is estimated to be 270 cfs.

Alternative 3: Replace the existing twin 51-inch and 750 lineal feet of 72-inch diameter pipes with the largest storm drain system that would fit under Avenida de la Playa given constraints of the existing utilities and right-of-way. The flow capacity of this alternative is estimated to be 310 or 400 cfs depending on which outlet structure option is selected, which is comparable with the flow capacity of the 72-inch diameter pipe immediately upstream of this pipe replacement (approximately 385 cfs).

Each of the storm drain system design alternatives includes two options for the outfall structure.

Option A: Construct a weir overflow structure at the same location as the current outfall structure. The weir crest elevation is estimated to be 5.5 feet NGVD based on the beach elevation at the time of the topographic survey.

Option B: Construct a new weir overflow structure approximately 100 feet west of the current outfall structure in line with Avenida de la Playa to obtain an additional foot of weir depth. The weir crest elevation is estimated to be 4.5 feet NGVD based on the beach elevation at the time of the topographic survey.

The hydrology and estimated design flow rates are presented in the Avenida de la Playa Storm Water Pipe Preliminary Analysis dated October 5, 2010 prepared by Tetra Tech.

Alternative Designs

The pipelines and weir structures were sized to allow approximately 1 foot of surcharge at the connecting structures. Structures under surcharge conditions will require sealed lids to prevent stormwater from discharging to the surface. The pipe is assumed to be a smooth-bore pipe and will need to be designed for a minimal cover condition. Additionally, manholes with formed channels should be used at all connecting structures to minimize head-loss through the structure.

The outfall structure configuration includes a weir of varying length with a low flow outlet, as shown in **Figure 1**. The weir crest is about 0.5 feet and 1.5 feet above the normal beach sand elevation for Options A and B respectively. Normal sand elevation was estimated based upon the topographic lines provided by the City as part of electronic drawings of existing conditions. The maximum allowable weir length was assumed to be 70 feet based on practical size limits of a square shaped outfall structure with an equivalent weir length on three sides. The side of the structure facing inland will be a solid wall in order to protect the pipe connection. The low flow outlet is sized to have a 24-inch diameter opening with a “tide-flex” check valve to prevent reverse flow and sand intrusion into the outfall structure. A notch in the weir above the low flow outlet will be included to flush any sand that may have accumulated near the low flow outlet. An interior trash screen would be provided that extends across the full interior width and height of the outlet structure, providing the maximum possible area for trash collection. The top of the structure would be at elevation 8 feet NGVD.

A variety of “tide-flex” check valves are available to prevent sediment intrusion, while allowing discharge during storm events. Valve selection is highly dependent on available head and location of the outfall structure along the beach; for this reason, the low flow outlet was not included in the alternative hydraulic analysis. The full capacity of the low flow outlet represents a small portion of the total discharge from the outfall structure when compared to the weir. The valve selection and analysis will occur as part of the final design.

Option A alternatives follow the existing pipe alignment. The invert elevation of the existing pipeline was assumed to be 0.5 feet NGVD at the existing outfall structure. The invert elevation was assumed to be 1.8 feet NGVD at the connection with the 72-inch-diameter pipeline, located at the intersection of Avenida de la Playa and Camino del Sol. The pipe elevation assumptions are based on as-built record drawings and limited topographic mapping.

Option B alternatives would maintain the existing invert elevation at the existing outfall structure, but a new location for the outfall structure and pipeline would be extended approximately 100 feet towards the ocean. The new outfall invert elevation is assumed to be lowered to elevation 0.0 feet NGVD. For all Option B alternatives, the pipe segment between La Vereda and the outfall would be installed at a very shallow depth and would be potentially exposed on the beach. The Avenida de la Playa beach access ramp could be extended to cover the pipe for this option.

Alternative 3 has an assumed maximum allowable storm drain width of 15 feet. This assumed storm drain width under Avenida de la Playa is limited by a sanitary manhole located approximately 120 feet west of Camino del Oro. Relocating the sanitary manhole would allow the pipe width to be increased to 20 feet. This alternative maximizes the pipe size based on the physical space available under Avenida de la Playa. Space for additional offline underground storm water detention storage was analyzed, but is not available in this area. A storage volume of 45 acre-feet would be required to reduce the 6-hour, 100-year design event to a peak flow of 130 cfs to match the capacity of the existing twin 51-inch diameter pipes. The volume provided by Alternative 3 (largest pipe alternative) is approximately 0.5 acre-feet, making peak flow attenuation at Avenida de la Playa negligible.

All design alternatives will include an overflow structure designed to address larger storm events. The location and size of this overflow structure will depend on the surcharge conditions of the selected alternative and the capacity of the storm drain system. Adding an overflow structure will allow conveyance of excess flow in the storm drain system to discharge along the Avenida de la Playa roadway in an efficient and directed manner. During final design, the roadway will be analyzed to maximize storm water conveyance capacities. The final design will also address the transition from Avenida de la Playa to the beach access ramp, which will include armoring and dissipation to minimize erosion along the beach surface.

Unique design characteristics for each storm drain design alternative are described in greater detail below. **Figure 2** shows a schematic overview of each of the alternatives. **Table 1** summarizes the alternative design concepts.

Alternative 1 with Option A:

- No pipe would be replaced with this alternative.
- Replace the existing outfall structure with a new 12-foot by 12-foot outfall structure to accommodate a 35-foot-long weir.

Alternative 1 with Option B:

- Eliminate the existing outfall structure and realign pipeline near La Vereda to connect with a new outfall structure location.
- Replace approximately 100 lineal feet of twin 51-inch diameter pipe with 225 lineal feet of twin 51-inch diameter pipes to the new outfall structure location.
- Construct a new 6-foot by 6-foot outfall structure to accommodate a 15-foot-long weir.

Alternative 2 with Option A:

- Replace the entire length (635 lineal feet) of existing twin 51-inch-diameter pipes with dual 51-inch-high by 72-inches-wide reinforced concrete box culverts.
- Replace the existing outfall structure with a new 25-foot by 25-foot outfall structure to accommodate a 70-foot-long weir.

Alternative 2 with Option B:

- Eliminate the existing outfall structure and realign pipeline near La Vereda to connect with a new outfall structure location.
- Replace the entire length (635 lineal feet) of existing twin 51-inch-diameter pipes with 760 lineal feet of dual 51-inch-high by 72-inches-wide reinforced concrete box culverts.
- Construct a new 12-foot by 12-foot outfall structure to accommodate a 35-foot-long weir.

Alternative 3 with Option A:

- Replace the entire length (635 lineal feet) of existing twin 51-inch-diameter pipes with dual 51-inch-high by 90-inches-wide reinforced concrete box culverts.
- Replace approximately 750 lineal feet of 72-inch diameter pipe between Camino del Sol and Paseo del Ocaso with 72-inch-high by 72-inch-wide reinforced concrete box culverts.
- Replace the existing outfall structure with a new 25-foot by 25-foot outfall structure to accommodate a 70-foot-long weir.

Alternative 3 with Option B:

- Eliminate the existing outfall structure and realign pipeline near La Vereda to connect with a new outfall structure location.
- Replace the entire length (635 lineal feet) of existing twin 51-inch-diameter pipes with 760 lineal feet of dual 51-inch-high by 90-inches-wide reinforced concrete box culverts.
- Replace approximately 750 lineal feet of 72-inch diameter pipe between Camino del Sol and Paseo del Ocaso with 72-inch-high by 72-inch-wide reinforced concrete box culverts.
- Construct a new 25-foot by 25-foot outfall structure to accommodate a 70-foot-long weir.

Alt.	Design Flow (cfs)	Storm Drain Configuration			Weir Configuration		Manhole 1 ^a	
		No.	Shape	Length/Size	Crest Elev. (feet NGVD)	Length (feet)	HGL Elev. (feet NGVD)	Surcharge (feet)
1A	130	2	Circ.	51" ^b	5.5	35	7.0	-0.8
1B	130	2	Circ.	225 LF 51" 635 LF 51" h x	4.5	15	6.8	-0.7
2A	270	2	Rect.	72" w 760 LF 51" h x	5.5	70	7.3	-1.1
2B	270	2	Rect.	72" w 635 LF 51" h x	4.5	35	7.1	-0.9
3A	310	2	Rect.	90" w	5.5	70	7.3	-1.1
		1	Rect.	750 LF 72" h x 72" w				
3B	400	2	Rect.	760 LF 51" h x	4.5	70	7.1	-0.9
		1	Rect.	90" w 750 LF 72" h x 72" w				

a. Manhole 1 is located on Avenida de la Playa approximately 150 feet west of current outfall location.

b. No pipe replaced for Alternative 1A.

Additional analysis is needed for final design. The design alternatives discussed in this document are dependent upon the assumed beach profile, which can vary over time based on environmental factors. Detailed survey information is needed to fully characterize the beach conditions and verify the beach elevation datum, as well as accurately determine the elevations

of pipe inverts, manhole rims, and lateral connections. This survey information will be used to accurately determine the storm drain capacity and size the pipe overflow structure.

Hydrodynamic Separators

The elimination of trash from the storm drain system is critical to maintaining the maximum capacity of the outfall structure. Under the current configuration, trash is collected within the outfall structure before discharging into the Area of Special Biological Significance. To prevent trash from clogging the outfall structure and reducing discharge capacity, hydrodynamic separators are proposed to be installed upstream to capture trash and debris before it enters the storm drain system.

CONTECH Construction Products, Inc. has supplied hydrodynamic separators such as the Continuous Deflective Separator (CDS) unit for CALTRANS and other California municipality projects. Treatment capacities of these CDS units range from low-flow (0.7 cfs) inline units designed for treatment of small commercial sites to large custom-built units designed to treat up to 175 cfs. Large, precast, offline CDS units are often the most cost-effective, as they are relatively easy to install and yet treat a large drainage area. Since the majority of trash in the watershed is usually included as part of the first flush of storm event, CDS units can be sized to treat the 1" storm event (first flush) and still capture the majority of trash in the watershed. Based on typical watershed characteristics for Avenida de la Playa, a large, offline CDS unit that is capable of treating 30 cfs could treat approximately 50 acres.

With an average treatment area of 50 acres and a total watershed area of nearly 820 acres, approximately 16 CDS units would be required to eliminate trash before it enters the outfall structure. This number is approximate as site constraints and storm drain pipe network configuration will ultimately determine CDS siting and the desired drainage area treated. The shape of the watershed, the pipe network layout, and additional infrastructure constraints could increase the total number of CDS units required for full watershed coverage.

Although it is desirable to provide full watershed coverage, installing the required number of CDS units makes this approach cost prohibitive. Since the specific source areas and volume of trash are unknown, a phased approach is recommended for installation of these units. For this project, a reduced number of units could be placed in strategic locations to maximize trash collection to reduce the overall impact of trash on the outfall structure. Under currently estimated rates available from the manufacturer, the CDS unit would need to be cleaned out twice per year. The outlet structure would also require maintenance, as it would be screened to collect trash not captured by the CDS units during larger storm events. The effectiveness of this approach would have to be monitored over time.

The proposed offline CDS unit would require a 10-foot diameter manhole structure attached to the drainage pipe using an 8-foot by 16-foot box structure. The total disturbed area for each

CDS unit would be approximately 30-foot by 30-foot. The manhole structure would extend 13 feet below the pipe invert to act as a vault for trash storage. A typical CDS unit configuration is shown in **Figure 3**.

Cost Analysis

A preliminary opinion of probable construction cost estimate has been completed for each alternative and summarized below in **Table 2**. These costs include demolition, roadway improvements, storm drain pipe installation, outfall construction, utility relocation, environmental permitting and other items necessary for the construction of each alternative. A total of five CDS units were included in each of the alternatives. At an estimated cost of \$112,000 to install each unit, trash removal represents a significant portion of the estimates. The largest cost increase between alternatives is due to the replacement of the existing storm drain pipes with larger reinforced concrete box culverts. The detailed preliminary opinion of probable construction cost estimate for the alternatives are attached.

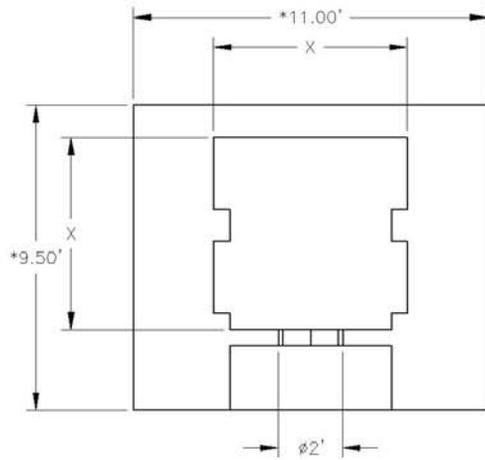
Table 2	
Opinion of Probable Construction Cost Preliminary Estimate Summary	
Alternative	Probable Cost Estimate
Alternative 1A	\$1,045,527
Alternative 1B	\$1,308,279
Alternative 2A	\$2,359,096
Alternative 2B	\$2,601,700
Alternative 3A	\$3,415,957
Alternative 3B	\$3,700,237

Recommendations

Alternative 2 with Option B is recommended, which replaces the full length of the existing twin 51-inch diameter pipes along Avenida de la Playa with twin 51-inch by 72-inch reinforced concrete box culverts to match the 270 cfs capacity of the upstream 72-inch diameter pipe. The greatest total cost increase is observed between Alternatives 1 and 2 due to the replacement of the existing storm drain pipes. However, increasing the capacity of the pipes to match the upstream capacity is an important component in reducing flooding along Avenida de la Playa.

Alternative 3 will provide additional capacity, but with a less appreciable effect. Constructing a new overflow structure approximately 100 feet west of the current outfall location under Option B will require additional cost and permit processing, but will move the outfall away from private property and will reduce the footprint of the outfall structure over Option A.

Trash and sand clogging the existing outfall is considered a major impairment to the outfall capacity. Although desirable to provide full treatment coverage of the watershed with CDS units, the high cost of installing CDS units makes it prohibitive at this time, since the specific source areas and volume of trash are unknown. A phased approach is recommended by placing five CDS units at strategic locations throughout the watershed. These units would be placed in areas of concern to maximize trash collection and reduce the impact of trash on the outfall structure. The effectiveness of this approach would have to be monitored over time.



X = 6' (AS DRAWN) FOR OPTION 1B
 X = 12' FOR OPTION 1A OR 2B
 X = 25' FOR OPTION 2A, 3A OR 3B
 *DIMENSION VARIES WITH "X"

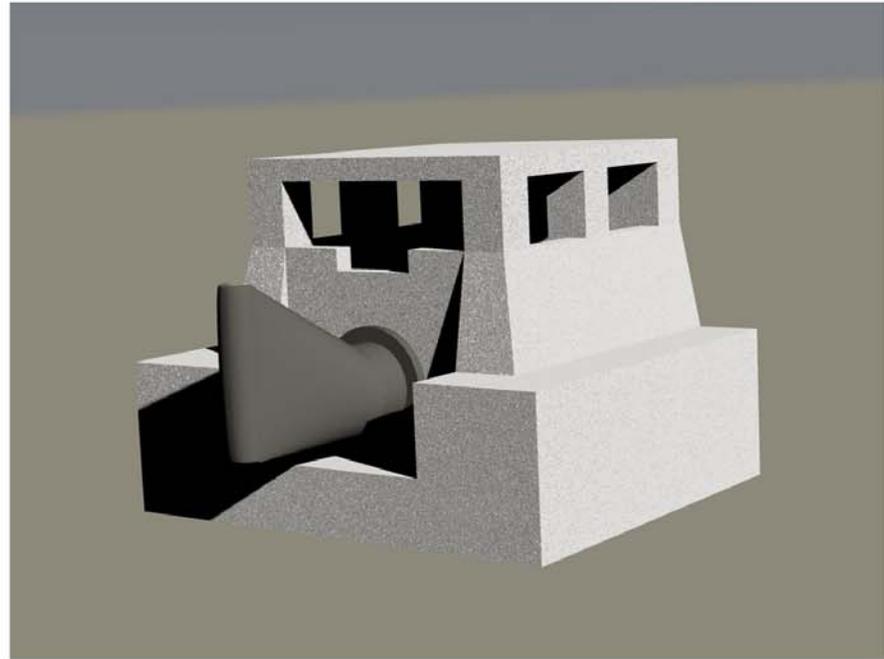
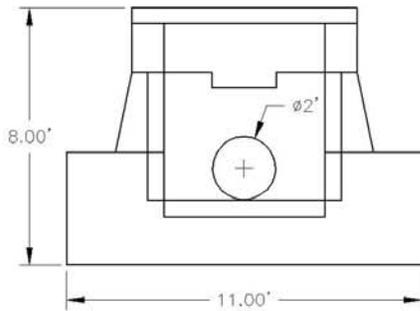


Figure 1: Outfall Structure Configuration

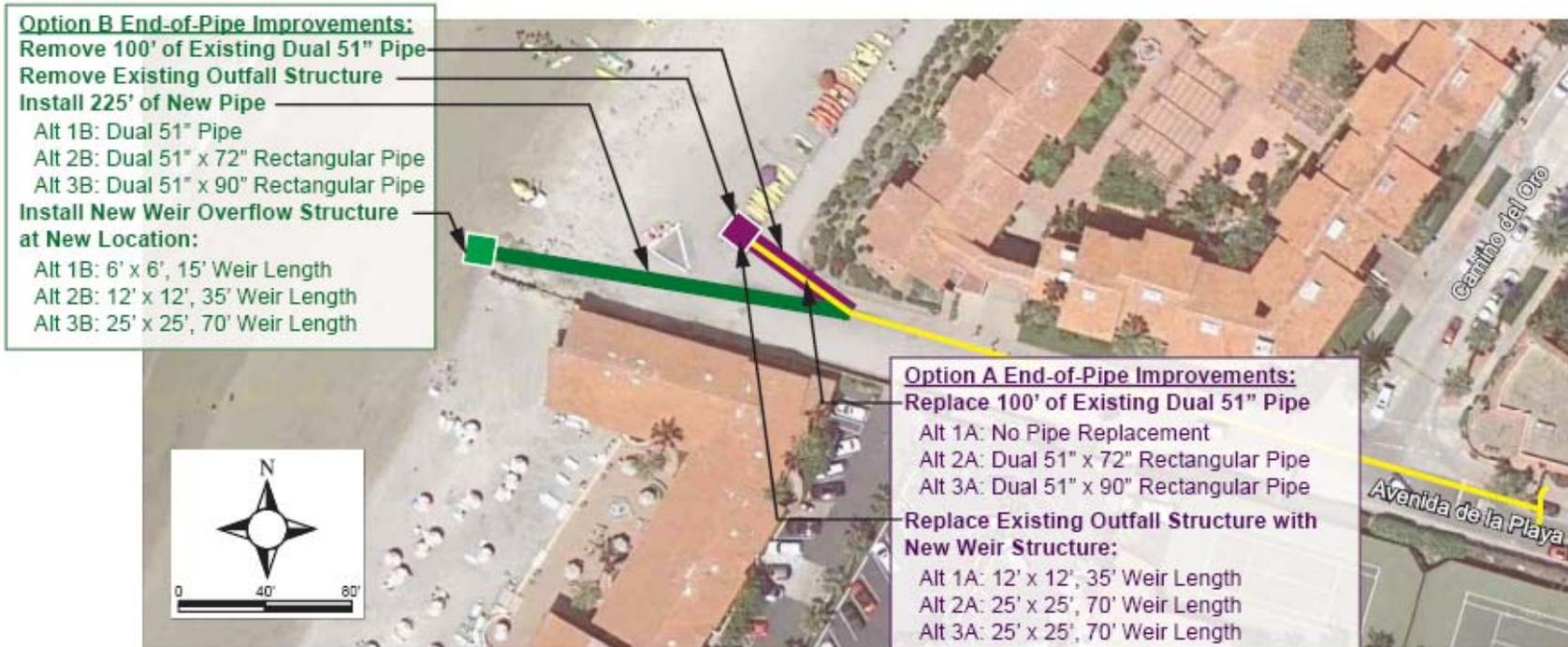
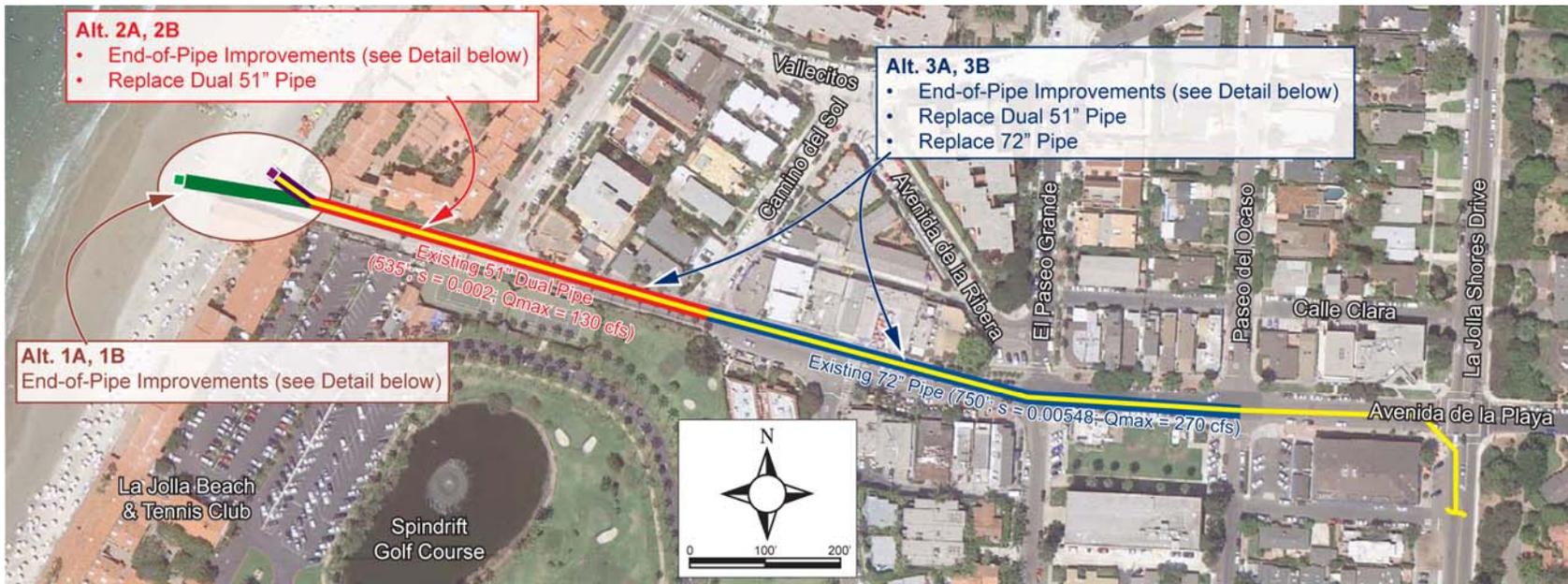


Figure 2 - Design Alternatives Overview

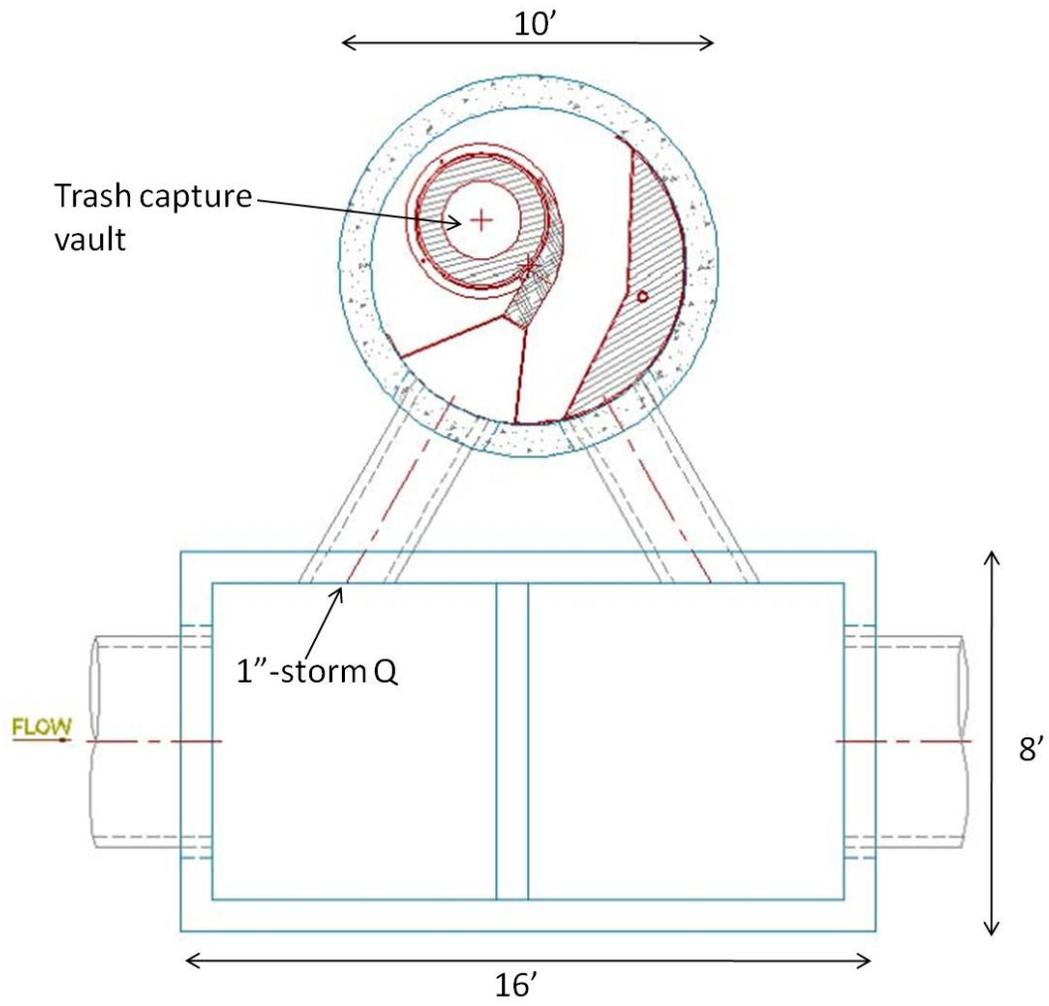


Figure 3 - Continuous Deflective Separator (CDS) Unit, Image courtesy CONTECH Construction Products, Inc.

CITY OF SAN DIEGO
AVENIDA DE LA PLAYA - STORM DRAIN UPGRADE
Opinion of Probable Construction Cost
Preliminary Estimate Alt. 1A

Description	Unit	Quantity	Unit Cost	Total
Site Demolition				
Remove existing dual 51" RCP storm drain	LF	0	\$ 28.00	\$ -
Remove existing headwall structure	EA	1	\$ 5,000.00	\$ 5,000
Remove existing transition structure	EA	0	\$ 2,500.00	\$ -
Remove existing 72" storm drain	LF	0	\$ 18.00	\$ -
Sawcut	LF	0	\$ 5.00	\$ -
Remove existing pavement	SF	0	\$ 3.40	\$ -
Remove existing sidewalk and curb	SF	0	\$ 23.00	\$ -
<i>Site Demolition Total</i>				\$ 5,000
Earthwork				
Structural backfill	CY	0	\$ 11.50	\$ -
<i>Earthwork Total</i>				\$ -
AC / Slurry Improvements				
AC pavement	SF	0	\$ 4.75	\$ -
Slurry seal	SF	0	\$ 0.99	\$ -
Road Outfall Reinforcement	SF	2000	\$ 25.00	\$ 50,000
Misc. surface improvements and landscaping	LS	0	\$ 100,000.00	\$ -
<i>AC Improvements Total</i>				\$ 50,000
PCC Improvements				
PCC sidewalk (4" standard)	SF	0	\$ 7.00	\$ -
Curb and gutter	LF	0	\$ 34.00	\$ -
Outlet structure	EA	1	\$ 10,000.00	\$ 10,000
Double RCB	LF	0	\$ 590.00	\$ -
Architectural Treatment	SF	120	\$ 15.00	\$ 1,800
Transition structure	EA	0	\$ 2,500.00	\$ -
Manhole / Flow equalization structure	EA	0	\$ 10,000.00	\$ -
Curb ramp w/ steel truncated domes	EA	13	\$ 2,500.00	\$ 32,500
Dry weather diversion pump and controls	EA	1	\$ 25,000.00	\$ 25,000
CDS Unit (large)	EA	5	\$ 112,000.00	\$ 560,000
PVC diversion line	LF	136	\$ 98.00	\$ 13,328
<i>PCC Improvements Total</i>				\$ 642,628
Traffic Control				
Traffic Control	LS	1	\$ 5,000.00	\$ 5,000
<i>Traffic Control Total</i>				\$ 5,000
Utility Relocation				
Relocate existing utilities	LS	0	\$ 100,000.00	\$ -
<i>Utility Relocation Total</i>				\$ -
Storm Water Pollution Prevention				
SWPPP Best Management Practices	LS	1	\$ 5,000.00	\$ 5,000
<i>Storm Water Pollution Prevention Total</i>				\$ 5,000
Environmental				
Environmental exemption	LS	1	\$ 50,000.00	\$ 50,000
<i>Environmental Total</i>				\$ 50,000
Total				\$ 757,628

Total		\$ 757,628
Mobilization, Bonds and Insurance	8%	\$ 60,610
Overhead and Profit	20%	\$ 151,526
Project Contingency	10%	\$ 75,763
Probable Construction Cost		\$ 1,045,527

Notes:

- This cost estimate is an opinion of probable cost only. These figures are supplied as a guide only. This firm is not responsible for fluctuation in cost of material, labor, components, or unforeseen contingencies.

CITY OF SAN DIEGO
AVENIDA DE LA PLAYA - STORM DRAIN UPGRADE
Opinion of Probable Construction Cost
Preliminary Estimate Alt 1B

Description	Unit	Quantity	Unit Cost	Total
Site Demolition				
Remove existing dual 51" RCP storm drain	LF	100	\$ 28.00	\$ 2,800
Remove existing headwall structure	EA	1	\$ 5,000.00	\$ 5,000
Remove existing transition structure	EA	0	\$ 2,500.00	\$ -
Remove existing 72" storm drain	LF	0	\$ 18.00	\$ -
Sawcut	LF	0	\$ 5.00	\$ -
Remove existing pavement	SF	0	\$ 3.40	\$ -
Remove existing sidewalk and curb	SF	0	\$ 23.00	\$ -
<i>Site Demolition Total</i>				\$ 7,800
Earthwork				
Structural backfill	CY	0	\$ 11.50	\$ -
<i>Earthwork Total</i>				\$ -
AC / Slurry Improvements				
AC pavement	SF	0	\$ 4.75	\$ -
Slurry seal	SF	0	\$ 0.99	\$ -
Road Outfall Reinforcement	SF	2000	\$ 25.00	\$ 50,000
Misc. surface improvements and landscaping	LS	0	\$ 100,000.00	\$ -
<i>AC Improvements Total</i>				\$ 50,000
PCC Improvements				
PCC sidewalk (4" standard)	SF	0	\$ 7.00	\$ -
Curb and gutter	LF	0	\$ 34.00	\$ -
Outlet structure	EA	1	\$ 10,000.00	\$ 10,000
Double 54" Pipes	LF	225	\$ 546.00	\$ 122,850
Architectural Treatment	SF	120	\$ 15.00	\$ 1,800
Transition structure (51" to 54")	EA	1	\$ 2,500.00	\$ 2,500
Manhole / Flow equalization structure	EA	0	\$ 10,000.00	\$ -
Curb ramp w/ steel truncated domes	EA	13	\$ 2,500.00	\$ 32,500
Dry weather diversion pump and controls	EA	1	\$ 25,000.00	\$ 25,000
CDS Unit (large)	EA	5	\$ 112,000.00	\$ 560,000
PVC diversion line	LF	261	\$ 98.00	\$ 25,578
<i>PCC Improvements Total</i>				\$ 780,228
Traffic Control				
Traffic Control	LS	1	\$ 5,000.00	\$ 5,000
<i>Traffic Control Total</i>				\$ 5,000
Utility Relocation				
Relocate existing utilities	LS	0	\$ 100,000.00	\$ -
<i>Utility Relocation Total</i>				\$ -
Storm Water Pollution Prevention				
SWPPP Best Management Practices	LS	1	\$ 5,000.00	\$ 5,000
<i>Storm Water Pollution Prevention Total</i>				\$ 5,000
Environmental				
Environmental exemption	LS	1	\$ 100,000.00	\$ 100,000
<i>Environmental Total</i>				\$ 100,000
Total				\$ 948,028
Total				\$ 948,028
Mobilization, Bonds and Insurance		8%	\$	75,842
Overhead and Profit		20%	\$	189,606
Project Contingency		10%	\$	94,803
Probable Construction Cost			\$	1,308,279

Notes:

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CITY OF SAN DIEGO
AVENIDA DE LA PLAYA - STORM DRAIN UPGRADE
Opinion of Probable Construction Cost
Preliminary Estimate Alt 2A

Description	Unit	Quantity	Unit Cost	Total
Site Demolition				
Remove existing dual 51" RCP storm drain	LF	635	\$ 28.00	\$ 17,780
Remove existing headwall structure	EA	1	\$ 5,000.00	\$ 5,000
Remove existing transition structure	EA	1	\$ 2,500.00	\$ 2,500
Remove existing 72" storm drain	LF	0	\$ 18.00	\$ -
Sawcut	LF	1300	\$ 5.00	\$ 6,500
Remove existing pavement	SF	12700	\$ 3.40	\$ 43,180
Remove existing sidewalk and curb	SF	200	\$ 23.00	\$ 4,600
<i>Site Demolition Total</i>				\$ 79,560
Earthwork				
Structural backfill	CY	1509	\$ 11.50	\$ 17,354
<i>Earthwork Total</i>				\$ 17,354
AC / Slurry Improvements				
AC pavement	SF	12700	\$ 4.75	\$ 60,325
Slurry seal	SF	12700	\$ 0.99	\$ 12,573
Road Outfall Reinforcement	SF	2000	\$ 25.00	\$ 50,000
Misc. surface improvements and landscaping	LS	1	\$ 50,000.00	\$ 50,000
<i>AC Improvements Total</i>				\$ 172,898
PCC Improvements				
PCC sidewalk (4" standard)	SF	1900	\$ 7.00	\$ 13,300
Curb and gutter	LF	200	\$ 34.00	\$ 6,800
Outlet structure	EA	1	\$ 19,500.00	\$ 19,500
RCB (51"X72")	LF	1270	\$ 500.00	\$ 635,000
Architectural Treatment	SF	250	\$ 15.00	\$ 3,750
Transition structure (72" to RCBs)	EA	1	\$ 2,500.00	\$ 2,500
Manhole / Flow equalization structure	EA	1	\$ 10,000.00	\$ 10,000
Curb ramp w/ steel truncated domes	EA	13	\$ 2,500.00	\$ 32,500
Dry weather diversion pump and controls	EA	1	\$ 25,000.00	\$ 25,000
CDS Unit (large)	EA	5	\$ 112,000.00	\$ 560,000
PVC diversion line	LF	136	\$ 98.00	\$ 13,328
<i>PCC Improvements Total</i>				\$ 1,321,678
Traffic Control				
Traffic Control	LS	1	\$ 10,000.00	\$ 10,000
<i>Traffic Control Total</i>				\$ 10,000
Utility Relocation				
Relocate existing utilities	LS	1	\$ 50,000.00	\$ 50,000
<i>Utility Relocation Total</i>				\$ 50,000
Storm Water Pollution Prevention				
SWPPP Best Management Practices	LS	1	\$ 8,000.00	\$ 8,000
<i>Storm Water Pollution Prevention Total</i>				\$ 8,000
Environmental				
Environmental exemption	LS	1	\$ 50,000.00	\$ 50,000
<i>Environmental Total</i>				\$ 50,000
			Total	\$ 1,709,490

Total		\$ 1,709,490
Mobilization, Bonds and Insurance	8%	\$ 136,759
Overhead and Profit	20%	\$ 341,898
Project Contingency	10%	\$ 170,949
Probable Construction Cost		\$ 2,359,096

Notes:

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CITY OF SAN DIEGO
AVENIDA DE LA PLAYA - STORM DRAIN UPGRADE
Opinion of Probable Construction Cost
Preliminary Estimate Alt 2B

Description	Unit	Quantity	Unit Cost	Total
Site Demolition				
Remove existing dual 51" RCP storm drain	LF	635	\$ 28.00	\$ 17,780
Remove existing headwall structure	EA	1	\$ 5,000.00	\$ 5,000
Remove existing transition structure	EA	1	\$ 2,500.00	\$ 2,500
Remove existing 72" storm drain	LF	0	\$ 18.00	\$ -
Sawcut	LF	1300	\$ 5.00	\$ 6,500
Remove existing pavement	SF	12700	\$ 3.40	\$ 43,180
Remove existing sidewalk and curb	SF	200	\$ 23.00	\$ 4,600
<i>Site Demolition Total</i>				\$ 79,560
Earthwork				
Structural backfill	CY	1509	\$ 11.50	\$ 17,354
<i>Earthwork Total</i>				\$ 17,354
AC / Slurry Improvements				
AC pavement	SF	12700	\$ 4.75	\$ 60,325
Slurry seal	SF	12700	\$ 0.99	\$ 12,573
Road Outfall Reinforcement	SF	2000	\$ 25.00	\$ 50,000
Misc. surface improvements and landscaping	LS	1	\$ 50,000.00	\$ 50,000
<i>AC Improvements Total</i>				\$ 172,898
PCC Improvements				
PCC sidewalk (4" standard)	SF	1900	\$ 7.00	\$ 13,300
Curb and gutter	LF	200	\$ 34.00	\$ 6,800
Outlet structure	EA	1	\$ 10,000.00	\$ 10,000
RCB (51"X72")	LF	1520	\$ 500.00	\$ 760,000
Architectural Treatment	SF	120	\$ 15.00	\$ 1,800
Transition structure (72" to RCBs)	EA	1	\$ 2,500.00	\$ 2,500
Manhole / Flow equalization structure	EA	1	\$ 10,000.00	\$ 10,000
Curb ramp w/ steel truncated domes	EA	13	\$ 2,500.00	\$ 32,500
Dry weather diversion pump and controls	EA	1	\$ 25,000.00	\$ 25,000
CDS Unit (large)	EA	5	\$ 112,000.00	\$ 560,000
PVC diversion line	LF	261	\$ 98.00	\$ 25,578
<i>PCC Improvements Total</i>				\$ 1,447,478
Traffic Control				
Traffic Control	LS	1	\$ 10,000.00	\$ 10,000
<i>Traffic Control Total</i>				\$ 10,000
Utility Relocation				
Relocate existing utilities	LS	1	\$ 50,000.00	\$ 50,000
<i>Utility Relocation Total</i>				\$ 50,000
Storm Water Pollution Prevention				
SWPPP Best Management Practices	LS	1	\$ 8,000.00	\$ 8,000
<i>Storm Water Pollution Prevention Total</i>				\$ 8,000
Environmental				
Environmental exemption	LS	1	\$ 100,000.00	\$ 100,000
<i>Environmental Total</i>				\$ 100,000
Total				\$ 1,885,290

Total		\$ 1,885,290
Mobilization, Bonds and Insurance	8%	\$ 150,823
Overhead and Profit	20%	\$ 377,058
Project Contingency	10%	\$ 188,529
Probable Construction Cost		\$ 2,601,700

Notes:

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CITY OF SAN DIEGO
AVENIDA DE LA PLAYA - STORM DRAIN UPGRADE
Opinion of Probable Construction Cost
Preliminary Estimate Alt 3A

Description	Unit	Quantity	Unit Cost	Total	
Site Demolition					
Remove existing dual 51" RCP storm drain	LF	635	\$ 28.00	\$ 17,780	
Remove existing headwall structure	EA	1	\$ 5,000.00	\$ 5,000	
Remove existing transition structure	EA	1	\$ 2,500.00	\$ 2,500	
Remove existing 72" storm drain	LF	717	\$ 18.00	\$ 12,906	
Sawcut	LF	2590	\$ 5.00	\$ 12,950	
Remove existing pavement	SF	28489	\$ 3.40	\$ 96,863	
Remove existing sidewalk and curb	SF	200	\$ 23.00	\$ 4,600	
<i>Site Demolition Total</i>				\$ 152,599	
Earthwork					
Structural backfill	CY	3212	\$ 11.50	\$ 36,938	
<i>Earthwork Total</i>				\$ 36,938	
AC / Slurry Improvements					
AC pavement	SF	28489	\$ 4.75	\$ 135,323	
Slurry seal	SF	28489	\$ 0.99	\$ 28,204	
Road Outfall Reinforcement	SF	2000	\$ 25.00	\$ 50,000	
Misc. surface improvements and landscaping	LS	1	\$ 100,000.00	\$ 100,000	
<i>AC Improvements Total</i>				\$ 313,527	
PCC Improvements					
PCC sidewalk (4" standard)	SF	1900	\$ 7.00	\$ 13,300	
Curb and gutter	LF	200	\$ 34.00	\$ 6,800	
Outlet structure	EA	1	\$ 19,500.00	\$ 19,500	
RCB (51"X90")	LF	1270	\$ 575.00	\$ 730,250	
RCB (72"X72")	LF	717	\$ 520.00	\$ 372,840	
Architectural Treatment	SF	250	\$ 15.00	\$ 3,750	
Transition structure	EA	2	\$ 2,500.00	\$ 5,000	
Manhole / Flow equalization structure	EA	1	\$ 10,000.00	\$ 10,000	
Curb ramp w/ steel truncated domes	EA	13	\$ 2,500.00	\$ 32,500	
Dry weather diversion pump and controls	EA	1	\$ 25,000.00	\$ 25,000	
CDS Unit (large)	EA	5	\$ 112,000.00	\$ 560,000	
PVC diversion line	LF	136	\$ 98.00	\$ 13,328	
<i>PCC Improvements Total</i>				\$ 1,792,268	
Traffic Control					
Traffic Control	LS	1	\$ 20,000.00	\$ 20,000	
<i>Traffic Control Total</i>				\$ 20,000	
Utility Relocation					
Relocate existing utilities	LS	1	\$ 100,000.00	\$ 100,000	
<i>Utility Relocation Total</i>				\$ 100,000	
Storm Water Pollution Prevention					
SWPPP Best Management Practices	LS	1	\$ 10,000.00	\$ 10,000	
<i>Storm Water Pollution Prevention Total</i>				\$ 10,000	
Environmental					
Environmental exemption	LS	1	\$ 50,000.00	\$ 50,000	
<i>Environmental Total</i>				\$ 50,000	
Total				\$ 2,475,331	
Total				\$ 2,475,331	
			Mobilization, Bonds and Insurance	8%	\$ 198,027
			Overhead and Profit	20%	\$ 495,066
			Project Contingency	10%	\$ 247,533
Probable Construction Cost				\$ 3,415,957	

Notes:

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CITY OF SAN DIEGO
AVENIDA DE LA PLAYA - STORM DRAIN UPGRADE
Opinion of Probable Construction Cost
Preliminary Estimate Alt 3B

Description	Unit	Quantity	Unit Cost	Total
Site Demolition				
Remove existing dual 51" RCP storm drain	LF	635	\$ 28.00	\$ 17,780
Remove existing headwall structure	EA	1	\$ 5,000.00	\$ 5,000
Remove existing transition structure	EA	1	\$ 2,500.00	\$ 2,500
Remove existing 72" storm drain	LF	717	\$ 18.00	\$ 12,906
Sawcut	LF	2590	\$ 5.00	\$ 12,950
Remove existing pavement	SF	28489	\$ 3.40	\$ 96,863
Remove existing sidewalk and curb	SF	200	\$ 23.00	\$ 4,600
<i>Site Demolition Total</i>				\$ 152,599
Earthwork				
Structural backfill	CY	3212	\$ 11.50	\$ 36,938
<i>Earthwork Total</i>				\$ 36,938
AC / Slurry Improvements				
AC pavement	SF	28489	\$ 4.75	\$ 135,323
Slurry seal	SF	28489	\$ 0.99	\$ 28,204
Road Outfall Reinforcement	SF	2000	\$ 25.00	\$ 50,000
Misc. surface improvements and landscaping	LS	1	\$ 100,000.00	\$ 100,000
<i>AC Improvements Total</i>				\$ 313,527
PCC Improvements				
PCC sidewalk (4" standard)	SF	1900	\$ 7.00	\$ 13,300
Curb and gutter	LF	200	\$ 34.00	\$ 6,800
Outlet structure	EA	1	\$ 19,500.00	\$ 19,500
RCB (51"X90")	LF	1520	\$ 575.00	\$ 874,000
RCB (72"X72")	LF	717	\$ 520.00	\$ 372,840
Architectural Treatment	SF	250	\$ 15.00	\$ 3,750
Transition structure	EA	2	\$ 2,500.00	\$ 5,000
Manhole / Flow equalization structure	EA	1	\$ 10,000.00	\$ 10,000
Curb ramp w/ steel truncated domes	EA	13	\$ 2,500.00	\$ 32,500
Dry weather diversion pump and controls	EA	1	\$ 25,000.00	\$ 25,000
CDS Unit (large)	EA	5	\$ 112,000.00	\$ 560,000
PVC diversion line	LF	261	\$ 98.00	\$ 25,578
<i>PCC Improvements Total</i>				\$ 1,948,268
Traffic Control				
Traffic Control	LS	1	\$ 20,000.00	\$ 20,000
<i>Traffic Control Total</i>				\$ 20,000
Utility Relocation				
Relocate existing utilities	LS	1	\$ 100,000.00	\$ 100,000
<i>Utility Relocation Total</i>				\$ 100,000
Storm Water Pollution Prevention				
SWPPP Best Management Practices	LS	1	\$ 10,000.00	\$ 10,000
<i>Storm Water Pollution Prevention Total</i>				\$ 10,000
Environmental				
Environmental exemption	LS	1	\$ 100,000.00	\$ 100,000
<i>Environmental Total</i>				\$ 100,000
Total				\$ 2,681,331
Total				\$ 2,681,331
Mobilization, Bonds and Insurance			8%	\$ 214,507
Overhead and Profit			20%	\$ 536,266
Project Contingency			10%	\$ 268,133
Probable Construction Cost				\$ 3,700,237

Notes:

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