VALUE ENGINEERING TRAINING STUDY REPORT

Linecrest Road over Conley Creek

Project No. BRZLB-0089-00(007)
DeKalb County
PI No. 771180
November 12, 2009

OWNER:

Georgia Department of Transportation
600 West Peachtree Street
Atlanta, GA 30308
(404.631.1770)

VALUE ENGINEERING INSTRUCTOR:

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3200 Town Point Drive NW, Suite 100
Kennesaw, GA 30144
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EXECUTIVE SUMMARY

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Study Background

This report presents the results of a value engineering (VE) study for roadway, bridge and intersection improvements on Linecrest Road in DeKalb County. The study was conducted as part of a VE training session held for GDOT staff on October 19 to 23, 2009.

Currently, there is no access provided over Conley Creek. East-west travel between Bouldercrest Road and Ward Lake Road currently carries traffic through residential areas. The completion of the bridge would provide new access to Seminole Road Landfill located on Ward Lake Road, thereby reducing landfill traffic in residential areas. Also, the addition of sidewalks along the proposed road would encourage alternatives to single-occupancy vehicles in the area. With the construction of the proposed road, traffic volumes on Ward Lake Road could be reduced by 60% in the build year (2005) and by up to 93% by the design year (2025).

The estimated construction cost of the project is $5,394,000, the R/W estimate is $215,000 yielding a total project cost of $5,609,000. On Monday, October 19, 2009, the design team gave an overview of the project to the VE team and on Friday, October 23, 2009, the VE Team presented their recommendations.

This report presents the VE Team's recommendations and all back-up information for consideration by the decision-makers. This **Executive Summary** includes a brief description of each recommendation. The **Study Identification** section contains information about the project and the team. The **Recommendations** section presents a more detailed description and support information about each recommendation. The **Appendix** includes a complete record of the Team's activities and findings as well as the worksheets developed during the information, creative and evaluation phases of the study. The reader is encouraged to review all sections of the report in order to obtain a complete understanding of the VE process.

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DEVELOPMENT PHASE - EXECUTIVE SUMMARY	
Project: **Linecrest Road over Conley Creek (PI #771180)** **Location:** Dekalb County	**Team:** 5 **Date:** 10/22/09

The project involves the construction of a new roadway and new bridge – the overall project length is 1.10 miles. Essentially, the project extends Linecrest Road from Ward Lake Road to Bouldercrest Road and includes a new bridge over Conley Creek Tributary. The project as designed has deficiencies in pavement structure, bridge design, concrete side barrier and sidewalk width.

The basic function of the new roadway is to improve east-west connectivity in southern DeKalb County. The project cost is estimated at $5.4 million.

The VE Team identified five (5) areas of opportunity for project improvement and cost savings. The first area involves the pavement structure. We reduced the quantity of asphalt and increased the amount of graded aggregate base (GAB) to lower the overall cost of the pavement without compromising the structural integrity. The second area is the bridge design. We reduced the number of spans and number of caissons. The widths of the bridge sidewalk and the bridge multi-use path were also reduced in this effort. We also specified a standard 3'-6" bridge parapet in place of the special design "Texas rail" concrete parapet. The third area was the pipe. We recommend investigating the use of PVC pipe for this project, which resulted in a cost savings. The fourth area is the sidewalk and multi-use path adjacent to the roadway. We determined that the most significant cost savings would come from eliminating the multi-use path. The fifth area is the concrete side barrier, which we recommended being replaced with a mechanically-stabilized earth (MSE) wall.

The implementation of these five recommendations would have the potential to save a total of $1,710,000.00 or 32% of the project cost. With the project undergoing right-of-way acquisition now, we feel there is adequate time to implement these recommendations before a construction contract is let. Implementation of these recommended changes would not have any adverse impacts on the project or require any additional right-of-way. The changes recommended in this VE study would actually improve the overall environmental impacts of the project in the area around the Conley Creek Tributary.

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DEVELOPMENT PHASE - SUMMARY OF COST SAVINGS

Project: **Linecrest Road over Conley Creek (PI #771180)**
Location: Dekalb County

Team No.: 5
Date: 10/22/09

Idea No.	Creative Idea Description	Original Initial Cost	Proposed Initial Cost	Initial Cost Savings	Future Savings	Total Life Cycle Savings
A-1	Evaluate Asphalt Pavement Typical Section	$571,000.00	$527,000.00	$44,000.00		
B-1	Evaluate Use of Culvert Instead of Bridge	$1,108,477.00	$571,664.00	$536,813.00		
B-3&9	Evaluate Use of Pre-stressed Concrete Beams and Span Lengths/Eliminate Piers	$308,625.00	$260,113.00	$48,512.00		
B-10	Reduce Sidewalk Width on Bridge to 5.5’	$1,217,040.00	$1,154,736.00	$62,304.00		
B-11	Eliminate Texas Rail	$112,459.00	$66,479.00	$45,980.00		
C-4	Re-evaluate Proposed Pipe Material/PVC	$259,000.00	$203,000.00	$56,000.00		
E-3	Eliminate Multi-Use Path	$250,062.00	$0	$250,062.00		
E-4	Eliminate Pedestrian Sidewalk	$106,697.00	$0	$106,697.00		
E-5	Eliminate Multi-Use Path & Sidewalk	$392,435.00	$0	$392,435.00		
E-6	Reduce Multi-Use Path Width to 8’	$250,062.00	$166,708.00	$83,354.00		
E-7	Eliminate Colored Beauty Strip	$124,000.00	$93,000.00	$31,000.00		
G-1	Use Gravity Wall in lieu of Side Barrier	$265,763.00	$212,610.00	$53,143.00		
				$1,710,000.00		

STUDY IDENTIFICATION

VE-1

STUDY IDENTIFICATION

Project:	Linecrest Road over Conley Creek	**Date:**	October 22, 2009
Location:	DeKalb County		

VE Team Members

Name:	Position:	Organization:	Telephone:
Lyn Clements	ADGM	GDOT Bridge D.	404.631.1849
Marlo Clowers	DGM	GDOT	404.631.1713
Cornelius Davis	Transportation Planner	FHWA	
Davida Kingsberry	ADGM	TEA	404.631.1890
Scott MacLean	ADGM	GDOT Road D.	404.631.1551
Gordon Sisk	ADGM	GDOT	404.631.1719
Angelo Yokaris	ADGM	GDOT Road D.	404.631.1631

Project Description

The project is located in Dekalb County near the Henry and Clayton County lines. The roadway is on new location.

The proposed typical section consists of two 12-ft. travel lanes with curb and gutter, a 12-ft. multi-use path on the north with 2-ft. colored stamped concrete beauty strip, a 5-ft. sidewalk on the south with 2-ft. colored stamped concrete beauty strips, and a new 354-ft. bridge over Conley Creek.

Project Constraints

1. Historic property in the southwest quadrant of the intersection of Linecrest Road with Fairview Road/Ward Lake Road
2. Conley Creek
3. Access to Ward Lake Road residential area
4. Future Sanitary Facility expansion
5. Future County Park

VE RECOMMENDATIONS

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DEVELOPMENT AND RECOMMENDATION PHASE

Project: Linecrest Road over Conley Creek

Idea No.: A-1	**Sheet No.:** of	**CREATIVE IDEA:** Reduce amount of asphalt on Linecrest Road, by using a deeper layer of graded aggregate base (GAB).

Comp By: ADY Date: 10.19.2009 Checked By: Date:

Original Concept: Use:
1½" – 12.5 mm Superpave (165 lbs/sy)
3" – 19 mm Superpave (330 lbs/sy)
6" – 25 mm Superpave (660 lbs/sy)
12" – Graded Aggregate Base (GAB)

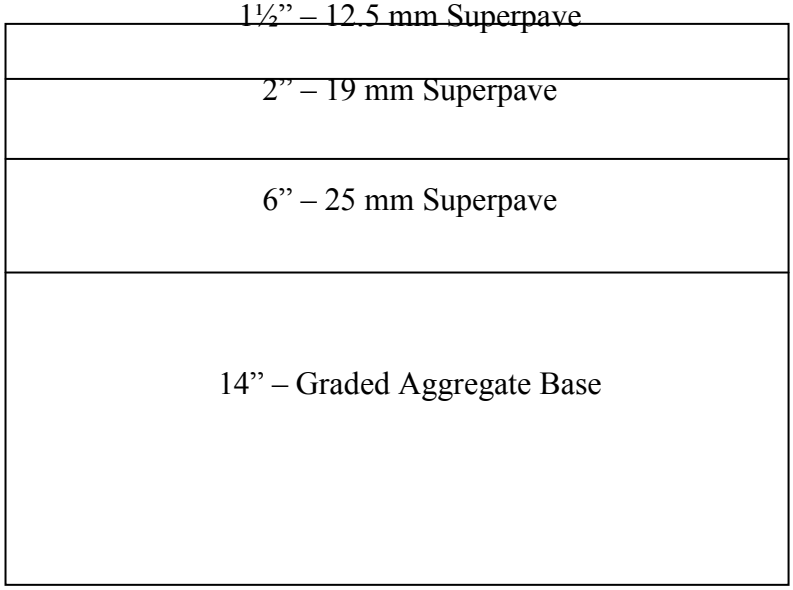
Proposed Change: Use:
1½" – 12.5 mm Superpave (165 lbs/sy)
2" – 19 mm Superpave (220 lbs/sy)
6" – 25 mm Superpave (660 lbs/sy)
14" – Graded Aggregate Base (GAB)

Justification: Graded aggregate base material has a significantly lower cost than any hot asphalt mix. In order to avoid compromising the pavement's structural integrity, as the 19 mm superpave layer is reduced by 1", the graded aggregate base is increased by 2", slightly increasing the overall pavement depth by 1". This design does not increase the number of lifts during construction. The amount of additional earthwork is considered negligible to affect grading complete.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	$571,000		
Proposed	$527,000		
Savings	$44,000		$44,000.00
FUTURE COST: Savings			$0
TOTAL PRESENT WORTH SAVINGS			**$44,000.00**

VE-9A

SKETCH	
Project: **Linecrest Road over Conley Creek**	Idea No. : A-1 Client:: Sheet of



VE-9B

COST WORKSHEET

Project: Linecrest Road over Conley Creek					Idea No.: A-1 Client:: Sheet of		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
310-1101 Graded Aggregate Base Crs, incl matl	TN	14,900	$17.85	$265,965.00	17,380	$17.85	$310,233.00
402-3190 Recycled Asph Conc 19mm Superpave, GP 1 or 2	TN	3,690	$68.49	$252,728.10	2,460	$68.49	$168,485.40
Subtotal:				$518,693.10			$478,718,40
Mark-up (10%)				$51,869.31			$47,871.84
Total				$570,562.41			$526,590.24
Total Rounded				**$571,000**			**$527,000**

VE-9C

CALCULATIONS

Project: **Linecrest Road over Conley Creek**	Idea No. : A-1 Client:: Sheet of

Aproximate Length of Linecrest Road ≈ 5,800 ft

Approximate Pavement Area of Linecrest Road ≈ 201,120 sf

19 mm Superpave (1" ≈ 110 lb/sqyd):

Design: 3" → (201,120 * 330 / 9) ≈ 3,690 tn

Idea: 2" → (201,120 * 220 / 9) ≈ 2,460 tn

GAB (1 cy ≈ 2 tn):

Design: 12" → (201,120 * 12/12) / 27 * 2 ≈ 14,900 tn

Idea: 14" → (201,120 * 14/12) / 27 * 2 ≈ 17,380 tn

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DEVELOPMENT AND RECOMMENDATION PHASE

Project: Linecrest Road over Conley Creek (PI # 771180)

Idea No.:	**Sheet No.:**	**CREATIVE IDEA:**
B-1	1 of 3	Use culvert in lieu of bridge

Comp By: DK Date: 10/22/09 Checked By: Date:10/22/09

Original Concept:
The project consists of a concrete bridge with four 59' spans (total length of 236ft).

Proposed Change:
Construct a culvert with seven 10'x 5' barrels.

Justification:
The hydraulic study states that the current conditions of the small drainage area would allow for a culvert. This use of a culvert would significantly reduce project cost in that it is quicker and easier to construct.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	1,108,477		
Proposed	571,664		
Savings	536,813		536,813
FUTURE COST: Savings			0
TOTAL PRESENT WORTH SAVINGS			**536,813**

VE-9B

COST WORKSHEET

Project: Linecrest Road over Conley Creek					Idea No.: B-1 Client:: Sheet 3 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Original Bridge	SF			1,108,477			
Proposed Culvert							
Concrete							441, 821
Rebar							110, 418
Wing Wall and Parapet							
Rebar							1,463
Concrete							17,962
Subtotal:				1,108,477			571,664
Mark-up (10 %)							57,166
Total							628,830
Total Rounded							628,830

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DEVELOPMENT AND RECOMMENDATION PHASE

Project: CR 164 (Linecrest Road) over Conley Creek Tributary

Idea No.:	**Sheet No.:**	**CREATIVE IDEA:**
B-3 & 9	1 of 3	Reduce the number of spans by using 54" bulb tee PSC beams thus eliminating 4 of 6 drilled caissons.

Comp By: DLC Date: 10/22/09 Checked By: Date:

Original Concept:

Bridge consists of four 59'-0" spans using seven type II PSC beams on six 3'-6" drilled caissons.

Proposed Change:

Proposed bridge consists of two 118'-0" spans using seven 54" bulb tee PSC beams on two 7'-6" drilled caissons.

Justification:

Due to the height of the bridge over the design storm allows for the using of a deeper beam section. Presently the cost of 54" bulb tee PSC beams is less costly than the cost of type II PSC beam. The use of two 7'-6" drilled caissons (larger diameter/smaller number) in lieu more six 3'-6" drilled caissons (smaller diameter/larger number) would reduce the cost of the drilled caissons.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	308,625		
Proposed	260,113		
Savings	48,512		48,512
FUTURE COST: Savings			0
TOTAL PRESENT WORTH SAVINGS			**48,512**

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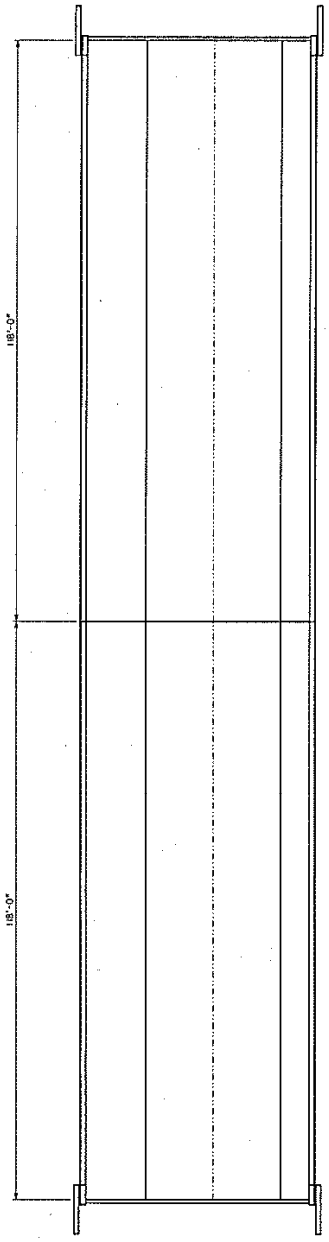
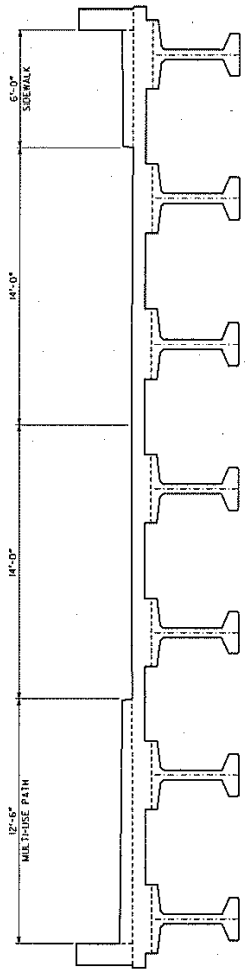
SKETCH

Project: CR 164 (Linecrest Road) over Conley Creek Tributary	Idea No. : B-3 & 9 Client:: GDOT Sheet 2 of 3





VE-9B

COST WORKSHEET

Project: CR 164 (Linecrest Road) over Conley Creek Tributary					Idea No.: B-3 & 9 Client:: GDOT Sheet 3 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Type II PSC Beams	LF	1,628	106	172,568			
42" Drilled Caissons	LF	180	600	108,000			
54" Bulb Tee PSC Beams	LF				1,617	98	158,466
90" Drilled Caissons	LF				60	1300	78,000
Subtotal:				280,568			236,466
Mark-up (10 %)				28,057			23,647
Total				308625			260,113
Total Rounded							**48,512**

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DEVELOPMENT AND RECOMMENDATION PHASE

Project: CR 164 (Linecrest Road) over Conley Creek Tributary

Idea No.: B-10	**Sheet No.:** 1 of 3	**CREATIVE IDEA:** Reduce the width of bridge by reducing the width of sidewalk and multi-use path.

Comp By: DLC Date: 10/22/09 Checked By: Date:

Original Concept:

Bridge consists of one 6'-0" sidewalk and 12'-6" multi-use path for a total bridge with of 48'-10".

Proposed Change:

Proposed bridge one 5-6" sidewalk and 10'-6" multi-use path for a total bridge width of 46'-4"

Justification:

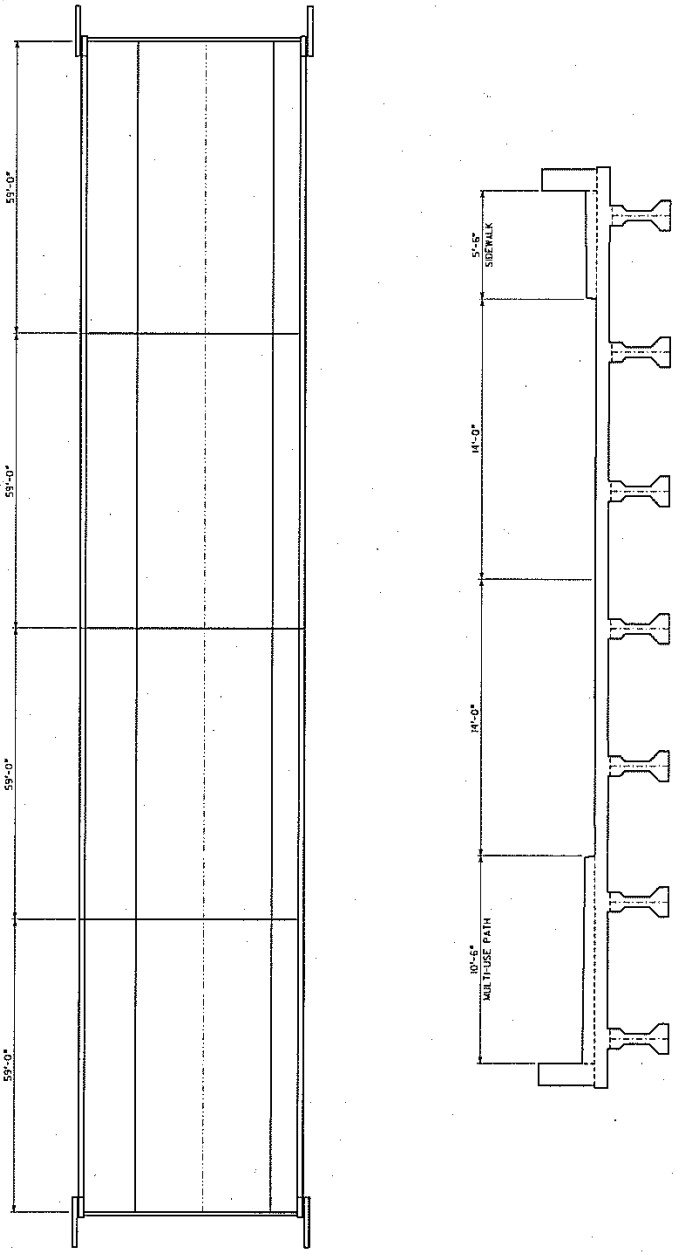
Based on GDOT Bridge and Structures Design Policy Manual, the width of sidewalks on bridges shall be 5'-6" to accommodate a 5'-0" roadway sidewalk. Using the same philosophy, a 10'-0" multi-use path should be a 10'-6" width on the bridge.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	1,217,040		
Proposed	1,154,736		
Savings	62,304		62,604
FUTURE COST: Savings			0
TOTAL PRESENT WORTH SAVINGS			**62,604**

SKETCH

Project: CR 164 (Linecrest Road) over Conley Creek Tributary

Idea No. : B-10
Client:: GDOT
Sheet 2 of 3



VE-9B

COST WORKSHEET

Project: CR 164 (Linecrest Road) over Conley Creek Tributary					Idea No.: B-10 Client:: GDOT Sheet 3 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Original Bridge	SF	11,525	96	1,106,400			
48'-10" width – 236'-0" length							
Original Bridge	SF				10,935	96	1,049,760
46'-4" width – 236'-0" length							
Subtotal:				1,106,400			1,049,760
Mark-up (%)				110,640			104,976
Total				1,217,040			1,154,736
Total Rounded							**62,304**

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DEVELOPMENT AND RECOMMENDATION PHASE

Project: CR 164 (Linecrest Road) over Conley Creek Tributary

Idea No.: B-11	**Sheet No.:** 1 of 4	**CREATIVE IDEA:** Use 3'-6" parapet in lieu of special design concrete parapet (Texas Rail)

Comp By: DLC Date: 10/22/09 Checked By: Date:

Original Concept:

Special design concrete parapet.

Proposed Change:

3'-6" parapet.

Justification:

Provides same function at reduced cost. The cost of special design concrete parapet is over 9 percent of the total cost of the bridge.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	112,459		
Proposed	66,479		
Savings	45,980		45,980
FUTURE COST: Savings			0
TOTAL PRESENT WORTH SAVINGS			**45,980**

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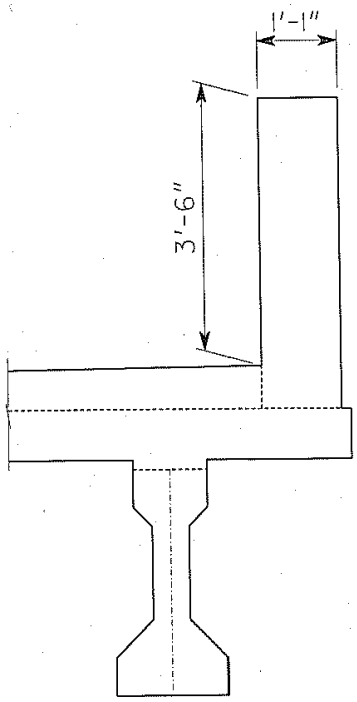
SKETCH

Project: CR 164 (Linecrest Road) over Conley Creek Tributary	Idea No. : B-11 Client:: GDOT Sheet 2 of 4



VE-9B

COST WORKSHEET

Project: CR 164 (Linecrest Road) over Conley Creek Tributary					Idea No.: B-11 Client:: GDOT Sheet 3 of 4		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Concrete parapet special design	LF	460	222.25	102,235			
48'-10" width – 236'-0" length							
3'-6" Parapet	SF				79	765	60,435
Paid for as superstructure concrete class AA							
Subtotal:				102,235			60,435
Mark-up (10 %)				10,224			6,044
Total				112,459			66,479
Total Rounded							**45,980**

VE-9C

CALCULATIONS

Project: **CR 164 (Linecrest Road) over Conley Creek Tributary**	Idea No. : B-11 Client:: GDOT Sheet 4 of 4

Superstructure Concrete, CL AA

$341,137 / 446 CY = $764.88 per CY

Left side
Height 3'-6" + 6" + 4.5" = 4.375'
(4.375' x 13" x 230') / 27 = 40.4 Cy

Right side
Height 3'-6" + 6" + 2.16" = 4.18'
(4.18' x 13" x 230') / 27 = 38.6 CY

Total CY of concrete for parapet = 79 CY

VE-9 **Team 5**

DEVELOPMENT AND RECOMMENDATION PHASE

Project: CR 164 Linecrest Road over Conley Creek

Idea No.:	**Sheet No.:**	**CREATIVE IDEA:** Use PVC instead of Concrete pipe.
C-4	of	

Comp By: GS Date: 10/22/09 Checked By: Date:

Original Concept: Use concrete pipes

Proposed Change: Use PVC pipes instead of concrete pipes.

Justification: For the same slope of pipe, PVC pipes convey a larger volume of water. The manning's coefficient for PVC pipe is .01 versus .012 for concrete pipe. Concrete pipes weigh more and are more difficult to handle versus PVC pipes. Significant cost savings are realized in using PVC and maintenance costs are also lower.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	$259,000		
Proposed	$203,000		
Savings	$56,000		$56,000
FUTURE COST: Savings			$0
TOTAL PRESENT WORTH SAVINGS			$56,000

VE-9B **Team 5**

COST WORKSHEET

Project: CR 164 Linecrest Road over Conley Creek					Idea No.: C-4 Client:: GDOT Sheet of		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
18 inch pipe	ft	4000	36.84	147,360	4000	27.50	110,000
24 inch pipe	ft	1600	44.71	71,536	1600	33.25	53,200
30 inch pipe	ft	680	58.37	39,691.60	680	36.85	25,058
GAB	TN	0	17.85		818	17.85	14,601.30
Subtotal:							
Mark-up (10%)							
Total				258,587.60			202,859.30
Total Rounded				**259,000**			**203,000**

VE-9C

CALCULATIONS	
Project: **CR 164 Linecrest Road over Conley Creek**	Idea No. : C-4 Client:: GDOT Sheet of

Volume of GAB required: 1(1.5)(4000)+1(2)(1600)+1(2.5)(680)= 10900 ft^3

Weight of GAB required: 150*10900/2000= 818 Tons

DEVELOPMENT AND RECOMMENDATION PHASE

Project: Linecrest Road over Conley Creek (PI #771180)

Idea No.: E-3	**Sheet No.:** of	**CREATIVE IDEA:** Eliminate North Multi-use Path

Comp By: MLC Date: 10/22/09 Checked By: SM Date:10/22/09

Original Concept:

The original concept proposed to construct 5552-ft. of 10-ft. multi-use trail including 2-ft. colored stamped concrete beauty strip along the north side of Linecrest Road and Bouldercrest Road.

Proposed Change:

The VE recommendation is to eliminate the proposed multi-use trail from the project.

Justification:

The project is located very near an existing sanitation facility and the facility is proposed to be expanded. A future park is proposed in the corridor. The completion date for the park has not been determine, therefore it is not necessary to construct the multi-use path as part of this project.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	$250,062.08		
Proposed	$0		
Savings	$250,062.08		$250,062.08
FUTURE COST: Savings			0
TOTAL PRESENT WORTH SAVINGS			$250,062.08

VE-9B

COST WORKSHEET

Project: Linecrest Road over Conley Creek (PI #771180)					Idea No.: E-3 Client:: D7/Dekalb County Sheet of		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Concrete Sidewalk 4”	SY	7402.7	$33.78	$250,062.08	0	$33.78	$0
Subtotal:		7402.7	$33.78	$250,062.08	0	$33.78	$0
Mark-up (10%)				$25,006.21			$0
Total				$275,068.29			$0
Total Rounded				**$276,000.00**			

VE-9C

CALCULATIONS

Project: Linecrest Road over Conley Creek (PI #771180)

Idea No. : E-3
Client::
Sheet of

See the Excel spreadsheet below.

		Length [ft]	Width [ft]	Path Area [SY]	Unit Cost	Final Savings
E-3	Elliminate North Multi-use Path	5552	12	7402.67	$33.78	$250,062.08
E-4	Elliminate South Pedestrian Sidewalk	5685.4	5	3158.58	$33.78	$106,696.76
E-5	Elliminate Multi-use Path & Sidewalk			10561.2	$33.78	$356,758.84
E-6	Reduce Multi-use Path Width	5552	8	4935.11	$33.78	$166,708.05
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$33.78	$84,355.72
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$45.00	$112,374.40

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DEVELOPMENT AND RECOMMENDATION PHASE

Project: Linecrest Road over Conley Creek (PI #771180)

Idea No.: E-4	**Sheet No.:** of	**CREATIVE IDEA:** Eliminate South Pedestrian Sidewalk

Comp By: MLC Date: 10/22/09 Checked By: SM Date:10/22/09

Original Concept:

The original concept proposed to construct 5685-ft. of 5-ft. sidewalk including 2-ft. colored stamped concrete beauty strip along the south side of Linecrest Road and the radius returns on both sides of Fairview Road.

Proposed Change:

The VE recommendation is to eliminate the proposed sidewalk from the project.

Justification:

The proposed sidewalk is located along the rear of the subdivision parcels. There is currently no sidewalk on the south side of Bouldercrest access that would provide access to the subdivisions, therefore sidewalk along Linecrest is not necessary.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	$106,696.76		
Proposed	$0		
Savings	$106,696.76		$106,696.76
FUTURE COST: Savings			$0
TOTAL PRESENT WORTH SAVINGS			$106,696.76

VE-9B

COST WORKSHEET

Project: Linecrest Road over Conley Creek (PI #771180)					Idea No.: E-4 Client:: D7/Dekalb County Sheet of		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Concrete Sidewalk 4”	SY	3158.6	$33.78	$106,696.76	0	$33.78	$0
Subtotal:		3158.6	$33.78	$106,696.76	0	$33.78	$0
Mark-up (10 %)				$10,669.68			$0
Total				$117,366.44			$0
Total Rounded				**$118,000.00**			**$0**

VE-9C

CALCULATIONS

Project: Linecrest Road over Conley Creek (PI #771180)	Idea No. : E-4 Client:: D7/Dekalb Co. Sheet of

See Excel Spreadsheet below.

		Length [ft]	Width [ft]	Path Area [SY]	Unit Cost	Final Savings
E-3	Elliminate North Multi-use Path	5552	12	7402.67	$33.78	$250,062.08
E-4	Elliminate South Pedestrian Sidewalk	5685.4	5	3158.58	$33.78	$106,696.76
E-5	Elliminate Multi-use Path & Sidewalk			10561.2	$33.78	$356,758.84
E-6	Reduce Multi-use Path Width	5552	8	4935.11	$33.78	$166,708.05
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$33.78	$84,355.72
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$45.00	$112,374.40

DEVELOPMENT AND RECOMMENDATION PHASE

Project: Linecrest Road over Conley Creek (PI #771180)

Idea No.: E-5	**Sheet No.:** of	**CREATIVE IDEA:** Eliminate Multi-use Path & Sidewalk

Comp By: MLC Date: 10/22/09 Checked By: SM Date: 10/22/09

Original Concept:

The original concept proposed to construct 5685-ft. of 5-ft. sidewalk including 2-ft. colored stamped concrete beauty strip along the south side of Linecrest Road and the radius returns on both sides of Fairview Road.

It also proposed to construct 5552-ft. of 10-ft. multi-use trail including 2-ft. colored stamped concrete beauty strip along the north side of Linecrest Road and Bouldercrest Road.

Proposed Change:

The VE recommendation is to eliminate the proposed sidewalk and multi-use trail from the project.

Justification:

The project is located very near an existing sanitation facility and the facility is proposed to be expanded. A future park is proposed in the corridor. The completion date for the park has not been determine, therefore it is not necessary to construct the multi-use path as part of this project.

The proposed sidewalk is located along the rear of the subdivision parcels. There is currently no sidewalk on the south side of Bouldercrest access that would provide access to the subdivisions, therefore sidewalk along Linecrest is not necessary.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	$392,434.72		
Proposed	$0		
Savings	$392,434.72		$392,434.72
FUTURE COST: Savings			$0
TOTAL PRESENT WORTH SAVINGS			$392,434.72

VE-9B

COST WORKSHEET

Project: Linecrest Road over Conley Creek (PI #771180)					Idea No.: E-5 Client:: D7/Dekalb Co. Sheet of		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Concrete Sidewalk 4”	SY	10561	$33.78	$356,758.84	0	$33.78	$0
Subtotal:		10561	$33.78	$356,758.84	0	$33.78	$0
Mark-up (%)				$35,675.89			$0
Total				$392,434.73			$0
Total Rounded				**$393,000.00**			**$0**

VE-9C

CALCULATIONS

Project: Linecrest Road over Conley Creek (PI #771180)

Idea No. : E-5
Client:: D7/Dekalb Co.
Sheet of

See Excel spreadsheet below.

		Length [ft]	Width [ft]	Path Area [SY]	Unit Cost	Final Savings
E-3	Elliminate North Multi-use Path	5552	12	7402.67	$33.78	$250,062.08
E-4	Elliminate South Pedestrian Sidewalk	5685.4	5	3158.58	$33.78	$106,696.76
E-5	Elliminate Multi-use Path & Sidewalk			10561.2	$33.78	$356,758.84
E-6	Reduce Multi-use Path Width	5552	8	4935.11	$33.78	$166,708.05
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$33.78	$84,355.72
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$45.00	$112,374.40

DEVELOPMENT AND RECOMMENDATION PHASE

Project: Linecrest Road over Conley Creek (PI #771180)

Idea No.:	**Sheet No.:**	**CREATIVE IDEA:**
E-6	of	Reduce Multi-use Path Width

Comp By: MLC Date: 10/22/09 Checked By: SM Date:10/22/09

Original Concept:

The proposed to construct 5552-ft. of 10-ft. multi-use trail including 2-ft. colored stamped concrete beauty strip along the north side of Linecrest Road and Bouldercrest Road.

Proposed Change:

The VE recommendation is to reduce the proposed multi-use trail width to 8-ft.

Justification:

The proposed multi-use trail width is excessive. The 1999 AASHTO Guide for Development of Bicycle Facilities allows a minimum of 8-ft. for a multi-use path for limited distances. The proposed project length is 1.2 miles, therefore it is possible to reduce the width of the multi-use trail.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	$250,062.08		
Proposed	$166,708.05		
Savings	$83,354.03		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			

VE-9B

COST WORKSHEET

Project: Linecrest Road over Conley Creek (PI #771180)					Idea No.: E-6 Client:: D7/Dekalb Co. Sheet of		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Concrete Sidewalk 4”	SY	7402.7	$33.78	$250,062.08	4935.1	$33.78	$166,708.05
Subtotal:		7402.7	$33.78	$250,062.08	4935.1	$33.78	$166,708.05
Mark-up (%)				$25,006.21			$16,670.85
Total				$275,068.29			$183,378.86
Total Rounded				**$276,000.00**			**$184,000.00**

VE-9C

CALCULATIONS

Project: Linecrest Road over Conley Creek (PI #771180)	Idea No. : E-6 Client:: D7/Dekalb Co. Sheet of

See the Excel spreadsheet below.

		Length [ft]	Width [ft]	Path Area [SY]	Unit Cost	Final Savings
E-3	Elliminate North Multi-use Path	5552	12	7402.67	$33.78	$250,062.08
E-4	Elliminate South Pedestrian Sidewalk	5685.4	5	3158.58	$33.78	$106,696.76
E-5	Elliminate Multi-use Path & Sidewalk			10561.2	$33.78	$356,758.84
E-6	Reduce Multi-use Path Width	5552	8	4935.11	$33.78	$166,708.05
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$33.78	$84,355.72
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$45.00	$112,374.40

DEVELOPMENT AND RECOMMENDATION PHASE

Project: Linecrest Road over Conley Creek (PI #771180)

Idea No.: E-7	**Sheet No.:** of	**CREATIVE IDEA:** Eliminate Colored Beauty Strip

Comp By: MLC Date: 10/22/09 Checked By: SM Date:10/22/07

Original Concept:

The original concept proposed to construct 5685-ft. of 5-ft. sidewalk including 2-ft. colored stamped concrete beauty strip along the south side of Linecrest Road and the radius returns on both sides of Fairview Road.

It also proposed to construct 5552-ft. of 10-ft. multi-use trail including 2-ft. colored stamped concrete beauty strip along the north side of Linecrest Road and Bouldercrest Road.

Proposed Change:

The VE recommendation is to eliminate the 2-ft. beauty from the proposed sidewalk and multi-use trail.

Justification:

The colored stamped concrete beauty strip is paid for in the within the cost of the 4-in. sidewalk. However, contractors will normally increase the bid for 4-in. sidewalk to compensate for the extra effort to batch the colored concrete and add the stamped brick pattern.

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	$124,000.00		
Proposed	$93,000.00		
Savings	$31,000.00		$31,000.00
FUTURE COST: Savings			$0
TOTAL PRESENT WORTH SAVINGS			$31,000.00

VE-9B

COST WORKSHEET

Project: Linecrest Road over Conley Creek (PI #771180)					Idea No.: E-7 Client:: D7/Dekalb Co. Sheet of		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Concrete Sidewalk 4”	SY	2492.7	$45.00	$112,374.40	2492.7	$33.78	$84,335.72
Subtotal:		2492.7	$45.00	$112,374.40	2492.7	$33.78	$84,335.72
Mark-up (%)				$11,237.44			$8,433.57
Total				$123,611.84			$92,769.29
Total Rounded				**$124,000.00**			**$93,000.00**

VE-9C

CALCULATIONS

Project: Linecrest Road over Conley Creek (PI #771180)

Idea No. : E-7
Client:: D7/Dekalb Co.
Sheet of

		Length [ft]	Width [ft]	Path Area [SY]	Unit Cost	Final Savings
E-3	Elliminate North Multi-use Path	5552	12	7402.67	$33.78	$250,062.08
E-4	Elliminate South Pedestrian Sidewalk	5685.4	5	3158.58	$33.78	$106,696.76
E-5	Elliminate Multi-use Path & Sidewalk			10561.2	$33.78	$356,758.84
E-6	Reduce Multi-use Path Width	5552	8	4935.11	$33.78	$166,708.05
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$33.78	$84,355.72
E-7	Elliminate Colored Beauty Strip	11237	2	2497.21	$45.00	$112,374.40

VE-9

DEVELOPMENT AND RECOMMENDATION PHASE

Project: Linecrest Road over Conley Creek (PI # 771180)

Idea No.:	**Sheet No.:**	**CREATIVE IDEA:**
G-1	1 of 3	Use MSE wall in lieu of concrete barrier wall

Comp By: DK Date: 10/22/09 Checked By: Date:10/22/09

Original Concept:
The project consists of a 372' concrete barrier wall.

Proposed Change:
Construct a 372' MSE wall.

Justification:
The Construction of a MSE wall will cut cost by about 25%

LIFE CYCLE COST SUMMARY	**INITIAL Project Cost**	FUTURE Project Cost	**TOTAL Present Worth** Cost
INITIAL COST: Original	265,763		
Proposed	212,610		
Savings	53,143		53,143
FUTURE COST: Savings			0
TOTAL PRESENT WORTH SAVINGS			53,143

VE-9B

COST WORKSHEET

Project: Linecrest Road over Conley Creek					Idea No.: G-1 Client:: Sheet 3 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
Item	**Unit**	**No. Units**	**Cost/Unit**	**Total Cost**	**No. Units**	**Cost/Unit**	**Total Cost**
Side Barrier Wall	SF			265,763			
MSE Wall	SF				4135	46	190,210
Copping	LF				400	56	22,400
Subtotal:				265,763			212,610
Mark-up (10 %)				26,576			21,261
Total				292,339			233,871
Total Rounded				292,339			**233,871**

APPENDIX

VE-2

INFORMATION PHASE - SOURCES

Approving/Authorizing Persons

Name:	Position:	Telephone:
Mike Lobdell, P.E.	District 7 Preconstruction	(770) 986-1257
Taylor Wright, P.E.	PBSJ Program Mgr - Presenter	(770) 933-0280
Gerald M. Ross, P.E.	Chief Engineer/Deputy Commissioner	(770) 631-1004

Personal Contacts

Name:	Telephone:	Notes:
Kevin McKeen	(770) 431-8666	PBSJ - Designer
Taylor Wright, P.E.	(770) 933-0280	PBSJ Program Mgr - Presenter
Mike Lobdell, P.E.	(770) 986-1257	District 7 Preconstruction
Byron Rushing	(404) 631-1778	GDOT Bike/Pedestrian Coordinator
Troy Patterson	(404) 631-1756	Estimator GDOT Eng. Svcs.
Susan Beck, P.E	(404) 631-1862	DGM - Bridge
Moussa Issa, P.E.	(404) 631-1657	Design Engineer
Randy Crumbley	(770) 914-3688	Engineer - Henry Co WSA
Julia Toole	1-800-881-1100	Contech

Documents/Abstracts

Reference:	Notes:
1999 AASHTO Bike/Ped. Manual	Used for recommendation E-6
GDOT Item Mean Summary	Pay item costs
GDOT Standards & Details	Culvert quantities

VE-3

INFORMATION PHASE - COST MODEL

Project Name: Linecrest Road over Conley Creek

Item	Description	$ Amount	% of Total Project
A	Pavement	1,529,000	27.3
B	Bridge	1,108,000	19.8
C	Drainage	670,000	11.9
D	Grading & Earthwork	602,000	10.7
E	Sidewalk	392,000	7.0
80% Cost Line			
F	Erosion Control	344,000	6.1
G	Side Barrier Wall	285,000	5.1
H	Signing & Marking	230,000	4.1
I	ROW	215,000	3.8
J	Guardrail	110,000	2.0
K	Miscellaneous	124,000	2.2
	TOTAL	**$5,609,000**	**100.0%**

VE-4

INFORMATION PHASE – FUNCTION ANALYSIS

Project: Linecrest Road over Conley Creek
Project Function: Provide access over Conley Creek

ITEM	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
No.		Verb	Noun	Cost	Worth	Comments
A	Pavement	Transmit	Load	$1,529,000	$1,450,000	5% reduce asphalt
		Improve	Ride			
B	Bridge	Connect	Road	$1,108,000	$1,000,000	Reduce # spans
		Cross	Water			Reduce # piers
						Modify handrail
C	Drainage	Remove	Water	$670,000	$600,000	Use rural typical
		Collect	Water			
		Convey	Water			
D	Grading & Earthwork	Achieve	Grade	$602,000	$602,000	No change, can be
		Prepare	Site			affected due to drainage
E	Sidewalk	Provide	Access	$392,000	$200,000	Use asphalt
		Provide	Refuge			Reduce Width
						Eliminate 1 or both

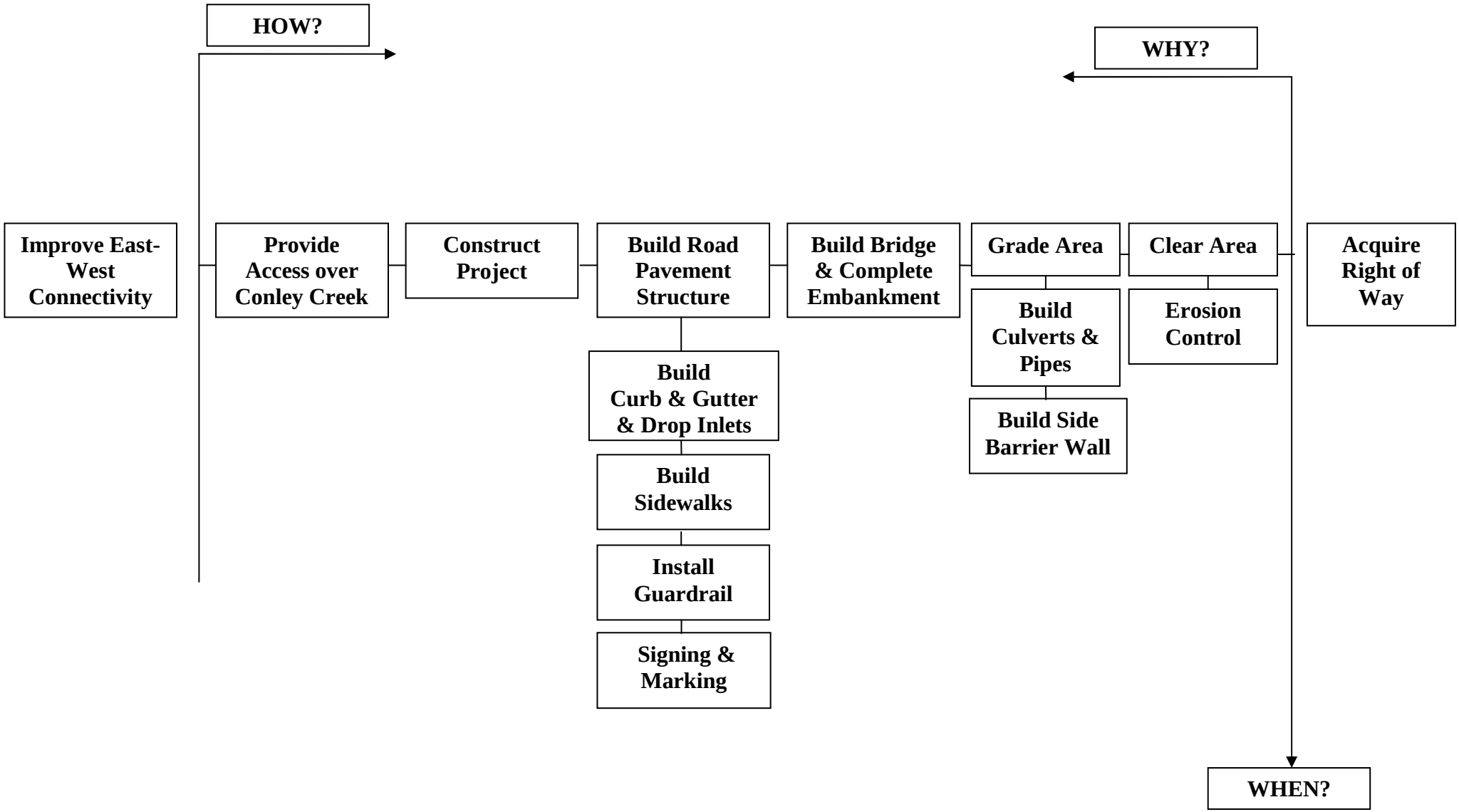
INFORMATION PHASE – FUNCTION ANALYSIS

Project: Linecrest Road over Conley Creek
Project Function: Provide access over Conley Creek

ITEM	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
No.		Verb	Noun	Cost	Worth	Comments
F	Erosion Control	Prevent	Erosion	$344,000	$340,000	Modify silt fence tp
		Reduce	Water velocities			Cost increase due to rural section (D)
G	Side Barrier Wall	Hold	Fill	$265,000	$240,000	Modify type and
		Reduce	Fill			height of wall
H	Signing & Marking	Convey	Information	$230,000	$200,000	Eliminate mast arms
		Direct	Traffic			Eliminate signal at Bouldercrest
I	ROW	Contain	Project	$215,000	$215,000	No change
J	Guardrail	Re-direct	Vehicles	$110,000	$110,000	No change
		Protect	Motorists			
K	Miscellaneous	Control	Traffic	$124,000	$124,000	No change
		Delineates	ROW			
		Provides	Res. access			

VE-5

INVESTIGATION PHASE - FAST DIAGRAM



VE-6 & 7

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	**CREATIVE IDEA**	**COMMENTS**	**IDEA RATING**
A	**Pavement**		
A-1	Evaluate Asphalt Pavement Typical Section	Low cost, High maintenance, Ease of Construction	10
A-2	Evaluate Use of Concrete Pavement	Very high cost, Low maintenance, Durable, High load bearing capacity	7
A-3	Evaluate Use of GAB as Surface Course	Very low cost, Low load bearing capacity, High maintenance	2
B	**Bridge**		
B-1	Evaluate Use of Culvert Instead of Bridge	Low cost, ease of construction, increased Fill, High maintenance	10
B-2	Evaluate Use of Steel Bridge	Very high cost, High maintenance cost, Long Spans	3
B-3	Evaluate Use of Pre-stressed Concrete Beams	Ease of construction, Low maintenance	9
B-4	Evaluate Use of Arch Bridge	High cost, Aesthetically pleasing	2
B-5	Evaluate Use of Precast Bridge	Increase number of drilled shafts, Speeds up construction time, high cost	2
B-6	Evaluate Use of Truss Bridge	High maintenance, Aesthetically pleasing	2

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	**CREATIVE IDEA**	**COMMENTS**	**IDEA RATING**
B-7	Evaluate Use of Asphalt Coated CMP	Hydraulically insufficient, Possible geotechnical problems	1
B-8	Evaluate Use of Bottomless Culverts (like Con Span)	Hydraulically insufficient, Possible geotechnical problems	1
B-9	Evaluate Span Lengths/Eliminate Piers	Reduces number of drilled caissons, Requires deep beams	9
B-10	Reduce Sidewalk to 5.5' & Multi-Use Path to 10.5'	Reduced bridge width, Lower cost	7
B-11	Eliminate Texas Rail	Very expensive, Aesthetically pleasing, High maintenance	9
C	**Drainage**		
C-1	Evaluate Use of Rural in lieu of Urban Section	Low cost eliminating C&G and urban drainage, modify pavement structure, and erosion control, possible need for more ROW	7
C-2	Re-evaluate Proposed Inlet Types	Improve efficiency, not necessarily more cost effective	4
C-3	Evaluate the Use of Porous Pavement	Get water off the road quicker, increase cost	5
C-4	Re-evaluate Proposed Pipe Material (use PVC)	Low cost, low maintenance	8

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	**CREATIVE IDEA**	**COMMENTS**	**IDEA RATING**
E	**Sidewalk**		
E-1	Evaluate the Use of Asphalt in lieu of Concrete	Lower cost, easier to construct	7
E-2	Evaluate the Use of bituminous treated GAB	Very low cost, easy to construct, high maintenance	6
E-3	Eliminate North Multi-use Path	Eliminate cost.	8
E-4	Eliminate South Pedestrian Sidewalk	Eliminate cost	8
E-5	Eliminate Multi-use Path & Sidewalk	Eliminate cost	7
E-6	Reduce Multi-use Path Width	Reduce cost	9
E-7	Eliminate colored Beauty Strip	Eliminate cost, adds no value other than aesthetically pleasing	10
G	**Side Barrier Wall**		
G-1	Use gravity wall in lieu of side barrier wall	Lower cost, easy to construct, additional ROW might be needed	9
G-2	Modify height of Side Barrier Wall	Lower cost, reduction in embankment	10
G-3	Steepen Shoulder/Eliminate Wall	Eliminate wall cost, possible additional ROW might be needed adding to cost, might have a problem with steeper than 2:1 slopes	5

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	**CREATIVE IDEA**	**COMMENTS**	**IDEA RATING**
H	**Signing and Marking/Signal**		
H-1	Evaluate the Use of Stop Sign/Bouldercrest	Low cost, traffic Signal might not be warranted	6
H-2	Use span wire to eliminate use of mast arms at traffic signals	Low cost	6