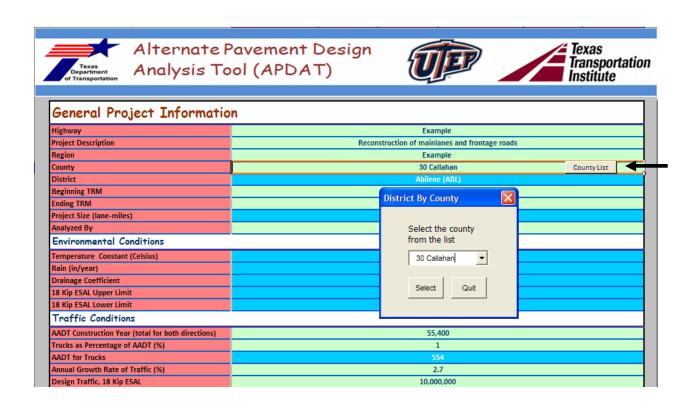# Quick Start Guide for the Alternate Pavement Design Analysis Tool (APDAT)

To begin using the APDAT, just double click on the "APDAT-12312008-X7.xls" icon

The cells highlighted in green are user input cells. The cells highlighted in blue are output cells generated by the APDAT.
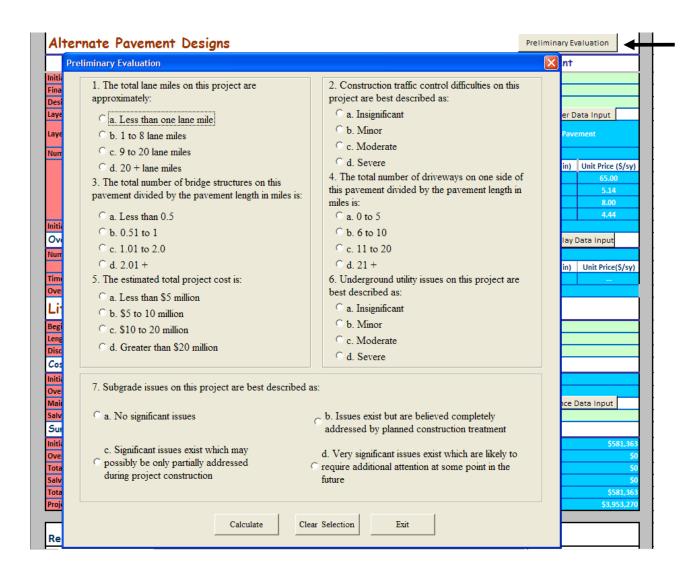
To select the county, click on the "County List" button as shown below. A dialog box will appear where you can select the county.

Alternate Pavement Design Analysis Tool (APDAT)	UTEP · Texas Transportation Institute

General Project Information

Highway	Example
Project Description	Reconstruction of mainlanes and frontage roads
Region	Example
County	30 Callahan
District	Abilene (ABL)
Beginning TRM	
Ending TRM	
Project Size (lane-miles)	
Analyzed By	

District By County

Select the county from the list

30 Callahan

Select   Quit

Environmental Conditions

Temperature Constant (Celsius)	
Rain (in/year)	
Drainage Coefficient	
18 Kip ESAL Upper Limit	
18 Kip ESAL Lower Limit	

Traffic Conditions

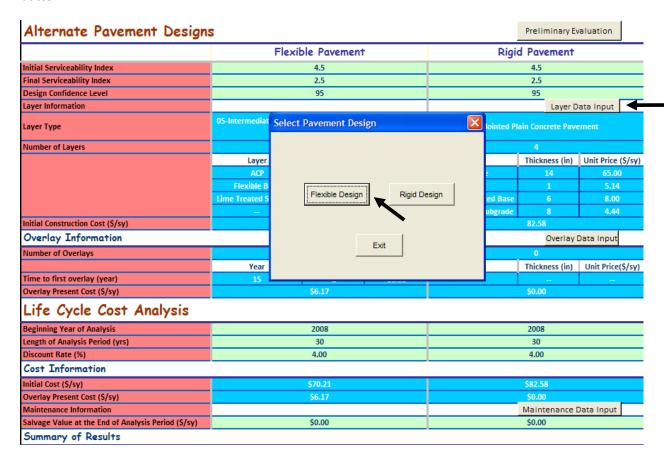| AADT Construction Year (total for both directions)	55,400
Trucks as Percentage of AADT (%)	1
AADT for Trucks	554
Annual Growth Rate of Traffic (%)	2.7
Design Traffic, 18 Kip ESAL	10,000,000

To conduct a preliminary evaluation, click on the "Preliminary Evaluation" button as shown below.

Alternate Pavement Designs

	Flexible Pavement			Rigid Pavement		
				Preliminary Evaluation		
Initial Serviceability Index	4.5			4.5		
Final Serviceability Index	2.5			2.5		
Design Confidence Level	95			95		
Layer Information				Layer Data Input		
Layer Type	05-Intermediate Thickness Asphaltic Concrete Pavement (2 1/2 to 5 1/2inches)			03-Jointed Plain Concrete Pavement		
Number of Layers	3			4		
	Layer	Thickness (in)	Unit Price($/sy)	Layer	Thickness (in)	Unit Price ($/sy)
	ACP	11.5	59.10	Concrete	14	65.00
	Flexible Base	6	6.67	ACP	1	5.14
	Lime Treated Subgrade	8	4.44	Cement Stabilized Base	6	8.00
	--	--	--	Lime Treated Subgrade	8	4.44
Initial Construction Cost ($/sy)	70.21			82.58		

Overlay Information

				Overlay Data Input		
Number of Overlays	1			0		
	Year	Thickness (in)	Unit Price($/sy)	Year	Thickness (in)	Unit Price($/sy)
Time to first overlay (year)	15	2	11.11	--	--	--
Overlay Present Cost ($/sy)	$6.17			$0.00		

Life Cycle Cost Analysis

	Flexible	Rigid
Beginning Year of Analysis	2008	2008
Length of Analysis Period (yrs)	30	30
Discount Rate (%)	4.00	4.00

Cost Information

	Flexible	Rigid
Initial Cost ($/sy)	$70.21	$82.58
Overlay Present Cost ($/sy)	$6.17	$0.00
Maintenance Information		Maintenance Data Input
Salvage Value at the End of Analysis Period ($/sy)	$0.00	$0.00

A dialog box will appear that contains a series of questions as shown below. After the questions are answered, APDAT will generate a recommendation concerning alternate bids.

Alternate Pavement Designs

Preliminary Evaluation

Preliminary Evaluation

1. The total lane miles on this project are approximately:

- a. Less than one lane mile
- b. 1 to 8 lane miles
- c. 9 to 20 lane miles
- d. 20 + lane miles

3. The total number of bridge structures on this pavement divided by the pavement length in miles is:

- a. Less than 0.5
- b. 0.51 to 1
- c. 1.01 to 2.0
- d. 2.01 +

5. The estimated total project cost is:

- a. Less than $5 million
- b. $5 to 10 million
- c. $10 to 20 million
- d. Greater than $20 million

2. Construction traffic control difficulties on this project are best described as:

- a. Insignificant
- b. Minor
- c. Moderate
- d. Severe

4. The total number of driveways on one side of this pavement divided by the pavement length in miles is:

- a. 0 to 5
- b. 6 to 10
- c. 11 to 20
- d. 21 +

6. Underground utility issues on this project are best described as:

- a. Insignificant
- b. Minor
- c. Moderate
- d. Severe

7. Subgrade issues on this project are best described as:

- a. No significant issues
- b. Issues exist but are believed completely addressed by planned construction treatment
- c. Significant issues exist which may possibly be only partially addressed during project construction
- d. Very significant issues exist which are likely to require additional attention at some point in the future

Calculate   Clear Selection   Exit

	Unit Price ($/sy)
	65.00
	5.14
	8.00
	4.44

	Unit Price($/sy)
	--

	$581,363
	$0
	$0
	$0
	$581,363
	$3,953,270

To input pavement layer data, click on the "Layer Input" button as shown below. A dialog box will appear indicating whether to put in flexible or rigid pavement data. First click on the "Flexible Design" button.

Alternate Pavement Designs

<div style="text-align:right">Preliminary Evaluation</div>

	Flexible Pavement	Rigid Pavement
Initial Serviceability Index	4.5	4.5
Final Serviceability Index	2.5	2.5
Design Confidence Level	95	95
Layer Information		Layer Data Input

Layer Type	05-Intermediat	...ointed Plain Concrete Pavement
Number of Layers		4

Layer		Thickness (in)	Unit Price ($/sy)
ACP		14	65.00
Flexible B...		1	5.14
Lime Treated S...	...ed Base	6	8.00
--	...ubgrade	8	4.44

Select Pavement Design

[Flexible Design]   [Rigid Design]

[Exit]

Initial Construction Cost ($/sy)		82.58

Overlay Information

		Overlay Data Input
Number of Overlays		0

Year		Thickness (in)	Unit Price($/sy)
Time to first overlay (year)	15	--	--
Overlay Present Cost ($/sy)	$6.17	$0.00	

Life Cycle Cost Analysis

Beginning Year of Analysis	2008	2008
Length of Analysis Period (yrs)	30	30
Discount Rate (%)	4.00	4.00

Cost Information

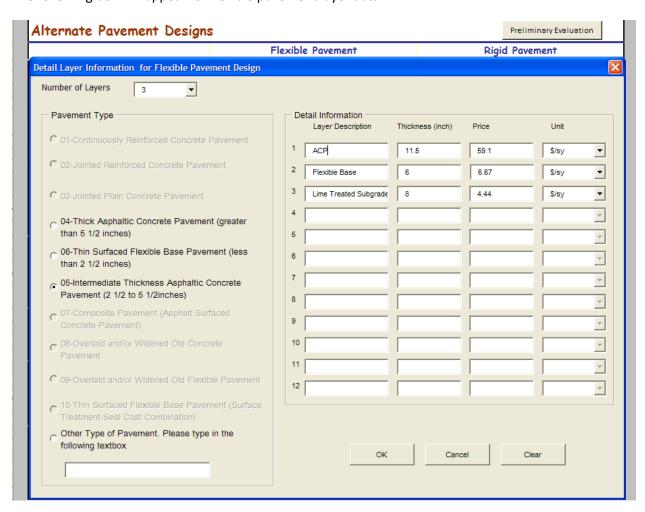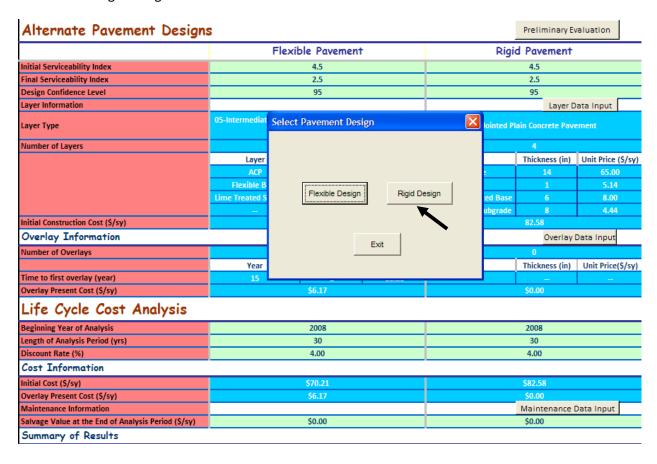| Initial Cost ($/sy)	$70.21	$82.58
Overlay Present Cost ($/sy)	$6.17	$0.00
Maintenance Information		Maintenance Data Input
Salvage Value at the End of Analysis Period ($/sy)	$0.00	$0.00

Summary of Results

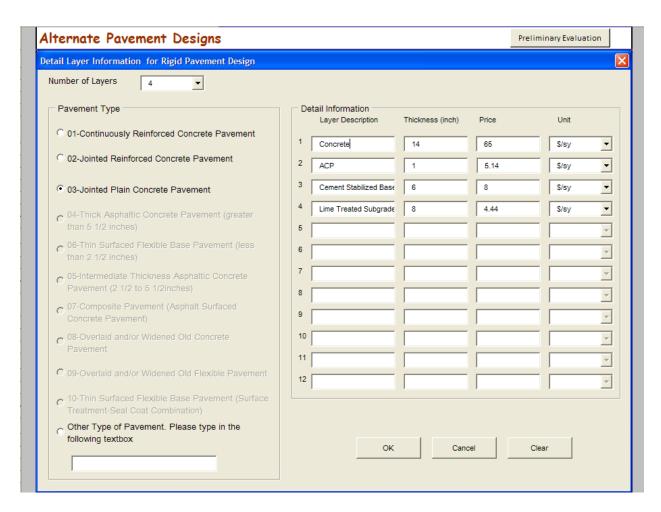The following box will appear for flexible pavement layer data.

You can input layer information here. When finished, press okay. You will go back to the previous dialog box.

Click on the "Rigid Design" button.

Alternate Pavement Designs

Preliminary Evaluation

	Flexible Pavement	Rigid Pavement
Initial Serviceability Index	4.5	4.5
Final Serviceability Index	2.5	2.5
Design Confidence Level	95	95
Layer Information		Layer Data Input

Layer Type	05-Intermediat...	Jointed Plain Concrete Pavement

Number of Layers: 4

Layer			Thickness (in)	Unit Price ($/sy)
ACP			14	65.00
Flexible B...			1	5.14
Lime Treated S...		...ed Base	6	8.00
--		...ubgrade	8	4.44

Initial Construction Cost ($/sy): 82.58

Overlay Information

Overlay Data Input

Number of Overlays: 0

Year			Thickness (in)	Unit Price($/sy)
15			--	--

Time to first overlay (year): 15

Overlay Present Cost ($/sy): $6.17 | $0.00

Life Cycle Cost Analysis

	Flexible	Rigid
Beginning Year of Analysis	2008	2008
Length of Analysis Period (yrs)	30	30
Discount Rate (%)	4.00	4.00

Cost Information

	Flexible	Rigid
Initial Cost ($/sy)	$70.21	$82.58
Overlay Present Cost ($/sy)	$6.17	$0.00
Maintenance Information		Maintenance Data Input
Salvage Value at the End of Analysis Period ($/sy)	$0.00	$0.00

Summary of Results

Select Pavement Design

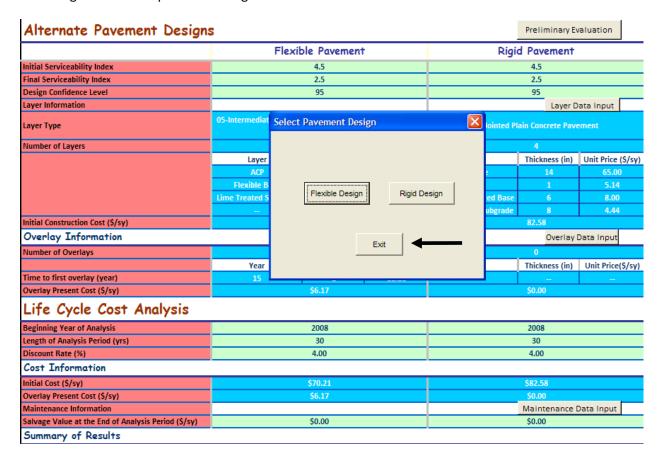Flexible Design   Rigid Design
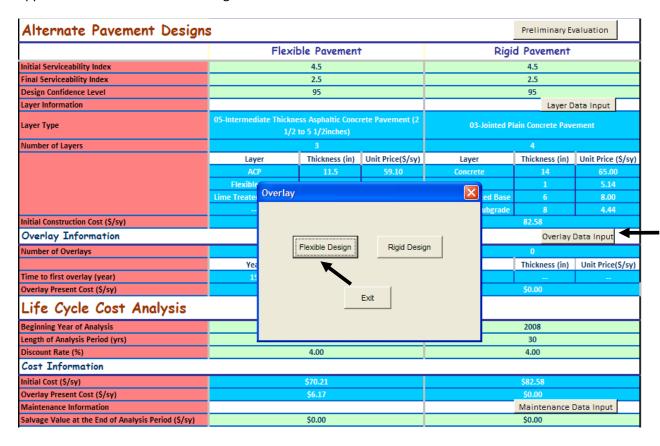
Exit

The following box will appear.

Again, you can input layer information here. When finished, click on the "OK" button.

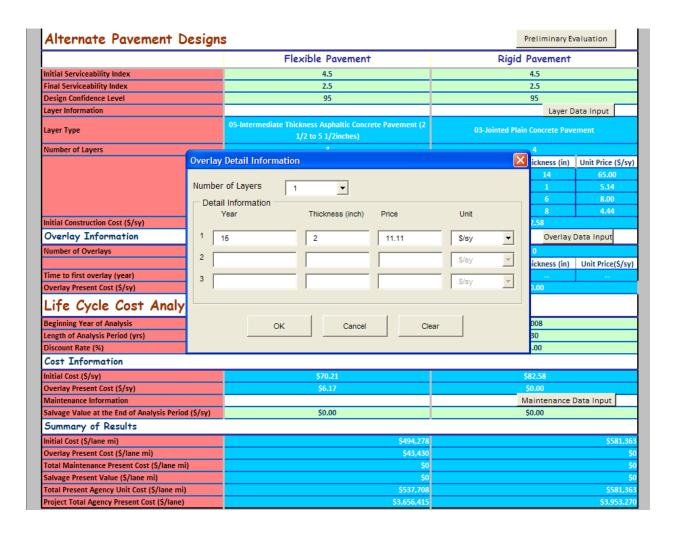You will go back to the previous dialog box. Click on the "Exit" button.

Alternate Pavement Designs

	Flexible Pavement	Rigid Pavement
Initial Serviceability Index	4.5	4.5
Final Serviceability Index	2.5	2.5
Design Confidence Level	95	95
Layer Information		Layer Data Input

Select Pavement Design dialog box:

Layer	Thickness (in)	Unit Price ($/sy)
ACP	14	65.00
Flexible B	1	5.14
Lime Treated S	6	8.00
--	8	4.44

Dialog box buttons: Flexible Design | Rigid Design | Exit

	Flexible Pavement	Rigid Pavement
Initial Construction Cost ($/sy)		82.58

Overlay Information
		Overlay Data Input
Number of Overlays		0

Year		Thickness (in)	Unit Price($/sy)
Time to first overlay (year)	15	--	--
Overlay Present Cost ($/sy)	$6.17	$0.00	

Life Cycle Cost Analysis

	Flexible Pavement	Rigid Pavement
Beginning Year of Analysis	2008	2008
Length of Analysis Period (yrs)	30	30
Discount Rate (%)	4.00	4.00

Cost Information
	Flexible Pavement	Rigid Pavement
Initial Cost ($/sy)	$70.21	$82.58
Overlay Present Cost ($/sy)	$6.17	$0.00
Maintenance Information		Maintenance Data Input
Salvage Value at the End of Analysis Period ($/sy)	$0.00	$0.00

Summary of Results

To input overlay information, click on the "Overlay Data Input" button as shown below. A dialog box will appear. Click on the "Flexible Design" button.

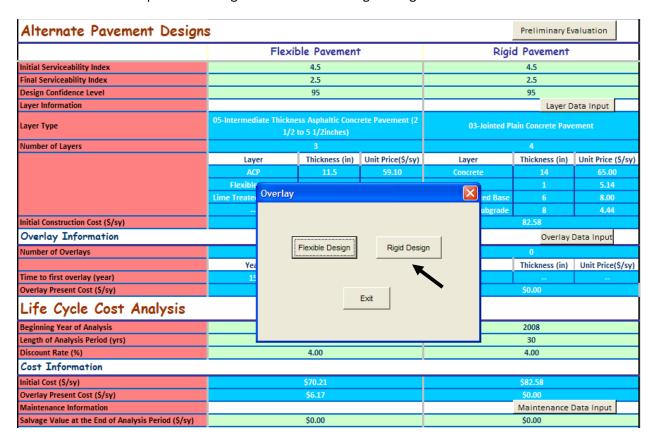| Alternate Pavement Designs						Preliminary Evaluation	
	Flexible Pavement			**Rigid Pavement**			
Initial Serviceability Index	4.5			4.5			
Final Serviceability Index	2.5			2.5			
Design Confidence Level	95			95			
Layer Information						Layer Data Input	
Layer Type	05-Intermediate Thickness Asphaltic Concrete Pavement (2 1/2 to 5 1/2inches)			03-Jointed Plain Concrete Pavement			
Number of Layers	3			4			
	Layer	Thickness (in)	Unit Price($/sy)	Layer	Thickness (in)	Unit Price ($/sy)	
	ACP	11.5	59.10	Concrete	14	65.00	
	Flexible				1	5.14	
	Lime Treated	Overlay		ed Base	6	8.00	
				ubgrade	8	4.44	
Initial Construction Cost ($/sy)				82.58			
Overlay Information		Flexible Design	Rigid Design			Overlay Data Input	←
Number of Overlays				0			
	Yea				Thickness (in)	Unit Price($/sy)	
Time to first overlay (year)	15				--	--	
Overlay Present Cost ($/sy)		Exit		$0.00			
Life Cycle Cost Analysis							
Beginning Year of Analysis				2008			
Length of Analysis Period (yrs)				30			
Discount Rate (%)	4.00			4.00			
Cost Information							
Initial Cost ($/sy)	$70.21			$82.58			
Overlay Present Cost ($/sy)	$6.17			$0.00			
Maintenance Information						Maintenance Data Input	
Salvage Value at the End of Analysis Period ($/sy)	$0.00			$0.00			

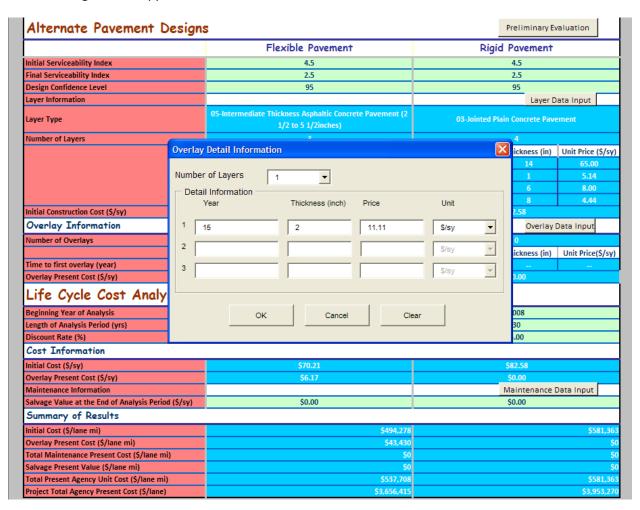The following box will appear:

Again, you can input the appropriate overlay information for the flexible pavement design. Click on the "OK" button when finished.

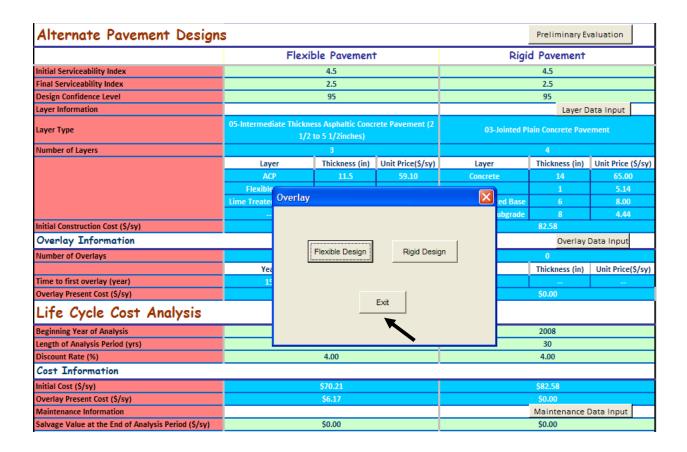You will return to the previous dialog box. Click on the "Rigid Design" button.

Alternate Pavement Designs				Preliminary Evaluation		
	Flexible Pavement			**Rigid Pavement**		
Initial Serviceability Index	4.5			4.5		
Final Serviceability Index	2.5			2.5		
Design Confidence Level	95			95		
Layer Information					Layer Data Input	
Layer Type	05-Intermediate Thickness Asphaltic Concrete Pavement (2 1/2 to 5 1/2inches)			03-Jointed Plain Concrete Pavement		
Number of Layers	3			4		
	Layer	Thickness (in)	Unit Price($/sy)	Layer	Thickness (in)	Unit Price ($/sy)
	ACP	11.5	59.10	Concrete	14	65.00
	Flexible				1	5.14
	Lime Treated			ed Base	6	8.00
	--			ubgrade	8	4.44
Initial Construction Cost ($/sy)				82.58		
Overlay Information					Overlay Data Input	
Number of Overlays				0		
	Yea				Thickness (in)	Unit Price($/sy)
Time to first overlay (year)	15				--	--
Overlay Present Cost ($/sy)				$0.00		
Life Cycle Cost Analysis						
Beginning Year of Analysis				2008		
Length of Analysis Period (yrs)				30		
Discount Rate (%)	4.00			4.00		
Cost Information						
Initial Cost ($/sy)	$70.21			$82.58		
Overlay Present Cost ($/sy)	$6.17			$0.00		
Maintenance Information				Maintenance Data Input		
Salvage Value at the End of Analysis Period ($/sy)	$0.00			$0.00		

Overlay

[Flexible Design]   [Rigid Design]

[Exit]

The following box will appear

Alternate Pavement Designs

	Flexible Pavement	Rigid Pavement
Initial Serviceability Index	4.5	4.5
Final Serviceability Index	2.5	2.5
Design Confidence Level	95	95
Layer Information		Layer Data Input
Layer Type	05-Intermediate Thickness Asphaltic Concrete Pavement (2 1/2 to 5 1/2inches)	03-Jointed Plain Concrete Pavement
Number of Layers		4

Overlay Detail Information box:

Number of Layers: 1

Detail Information

	Year	Thickness (inch)	Price	Unit
1	15	2	11.11	$/sy
2				$/sy
3				$/sy

OK   Cancel   Clear

Partial right-column values: ickness (in) / Unit Price ($/sy): 14 – 65.00; 1 – 5.14; 6 – 8.00; 8 – 4.44

	Flexible Pavement	Rigid Pavement
Initial Construction Cost ($/sy)		2.58
Overlay Information		Overlay Data Input
Number of Overlays		0
Time to first overlay (year)		ickness (in) / Unit Price($/sy): -- / --
Overlay Present Cost ($/sy)		0.00
Life Cycle Cost Analy		
Beginning Year of Analysis		008
Length of Analysis Period (yrs)		30
Discount Rate (%)		.00
Cost Information		
Initial Cost ($/sy)	$70.21	$82.58
Overlay Present Cost ($/sy)	$6.17	$0.00
Maintenance Information		Maintenance Data Input
Salvage Value at the End of Analysis Period ($/sy)	$0.00	$0.00
Summary of Results		
Initial Cost ($/lane mi)	$494,278	$581,363
Overlay Present Cost ($/lane mi)	$43,430	$0
Total Maintenance Present Cost ($/lane mi)	$0	$0
Salvage Present Value ($/lane mi)	$0	$0
Total Present Agency Unit Cost ($/lane mi)	$537,708	$581,363
Project Total Agency Present Cost ($/lane)	$3,656,415	$3,953,270

Preliminary Evaluation

You can input the appropriate overlay information for the rigid pavement design. Click on the "OK" button when finished.

You will return to the previous dialog box. Click on the "Okay" button to return to the worksheet.

Alternate Pavement Designs

	Preliminary Evaluation

	Flexible Pavement	Rigid Pavement
Initial Serviceability Index	4.5	4.5
Final Serviceability Index	2.5	2.5
Design Confidence Level	95	95
Layer Information		Layer Data Input
Layer Type	05-Intermediate Thickness Asphaltic Concrete Pavement (2 1/2 to 5 1/2inches)	03-Jointed Plain Concrete Pavement
Number of Layers	3	4

Layer	Thickness (in)	Unit Price($/sy)	Layer	Thickness (in)	Unit Price ($/sy)
ACP	11.5	59.10	Concrete	14	65.00
Flexible				1	5.14
Lime Treated			ed Base	6	8.00
			ubgrade	8	4.44

Overlay ✕

[Flexible Design]   [Rigid Design]

[Exit]

Initial Construction Cost ($/sy)		82.58
Overlay Information		Overlay Data Input
Number of Overlays		0
	Yea	Thickness (in)	Unit Price($/sy)
Time to first overlay (year)	15	--	--
Overlay Present Cost ($/sy)		$0.00

Life Cycle Cost Analysis

Beginning Year of Analysis		2008
Length of Analysis Period (yrs)		30
Discount Rate (%)	4.00	4.00

Cost Information

Initial Cost ($/sy)	$70.21	$82.58
Overlay Present Cost ($/sy)	$6.17	$0.00
Maintenance Information		Maintenance Data Input
Salvage Value at the End of Analysis Period ($/sy)	$0.00	$0.00

To input maintenance cost information, click on the "Maintenance Data Input" button as shown below.

Alternate Pavement Designs

	Flexible Pavement			Rigid Pavement			
					Preliminary Evaluation		
Initial Serviceability Index	4.5			4.5			
Final Serviceability Index	2.5			2.5			
Design Confidence Level	95			95			
Layer Information					Layer Data Input		
Layer Type	05-Intermediate Thickness Asphaltic Concrete Pavement (2 1/2 to 5 1/2inches)			03-Jointed Plain Concrete Pavement			
Number of Layers	3			4			
	Layer	Thickness (in)	Unit Price($/sy)	Layer	Thickness (in)	Unit Price ($/sy)	
	ACP	11.5	59.10	Concrete	14	65.00	
	Flexible Base	6	6.67	ACP	1	5.14	
	Lime Treated Subgrade	8	4.44	Cement Stabilized Base	6	8.00	
	--	--	--	Lime Treated Subgrade	8	4.44	
Initial Construction Cost ($/sy)	70.21			82.58			

Overlay Information

					Overlay Data Input		
Number of Overlays	1			0			
	Year	Thickness (in)	Unit Price($/sy)	Year	Thickness (in)	Unit Price($/sy)	
Time to first overlay (year)	15	2	11.11	--	--	--	
Overlay Present Cost ($/sy)	$6.17			$0.00			

Life Cycle Cost Analysis

	Flexible			Rigid			
Beginning Year of Analysis	2008			2008			
Length of Analysis Period (yrs)	30			30			
Discount Rate (%)	4.00			4.00			

Cost Information

	Flexible			Rigid			
Initial Cost ($/sy)	$70.21			$82.58			
Overlay Present Cost ($/sy)	$6.17			$0.00			
Maintenance Information					Maintenance Data Input		
Salvage Value at the End of Analysis Period ($/sy)	$0.00			$0.00			

You will be taken to the "Maintenance Information" worksheet where the maintenance cost information can be input. Once the data is input, click on the "Go Back to Project Information Main Worksheet" button to return to the previous worksheet.

	Maintenance Costs		Go Back to Project Information Main Worksheet	

	Flexible Pavement		Rigid Pavement	
Year	Cost ($/sy)	Description	Cost ($/sy)	Description
1	$0.00		$0.00	
2	$0.00		$0.00	
3	$0.00		$0.00	
4	$0.00		$0.00	
5	$0.00		$0.00	
6	$0.00		$0.00	
7	$0.00		$0.00	
8	$0.00		$0.00	
9	$0.00		$0.00	
10	$0.00		$0.00	
11	$0.00		$0.00	
12	$0.00		$0.00	
13	$0.00		$0.00	
14	$0.00		$0.00	
15	$0.00		$0.00	
16	$0.00		$0.00	
17	$0.00		$0.00	
18	$0.00		$0.00	
19	$0.00		$0.00	
20	$0.00		$0.00	
21	$0.00		$0.00	
22	$0.00		$0.00	
23	$0.00		$0.00	
24	$0.00		$0.00	
25	$0.00		$0.00	
26	$0.00		$0.00	
27	$0.00		$0.00	
28	$0.00		$0.00	
29	$0.00		$0.00	
30	$0.00		$0.00	

Range for Alternate Pavement Designs: 20.00%

It is highly recommended to consult with District maintenance personnel concerning appropriate maintenance costs for different pavement structures. You can use the "Maintenance Lookup Searching Tool" (MLSTool) to retrieve maintenance costs. Maintenance costs provided by MLSTool are based on statistical analysis of data stored in the Pavement Management Information System (PMIS) from Maintenance Management Informatin System (PMIS).

MLSTool suggests maintenance costs from cumulative frequency analysis conducted by type of pavement and project location. Percentage of cumulative frequency can be increased progresively over the years to reflect increase in maintenance costs over time. For example, 5% at year 1 and 95% at year 30.

Note the reference to the Maintenance Lookup Searching Tool. This is a separate Excel spreadsheet titled, "MLSTool-12312008.xls" where maintenance data from MMIS is contained. It is highly recommended to consult with District Maintenance personnel concerning appropriate maintenance costs for different pavement structures.

After all of the data is input, the summary portion of the worksheet will show the results and a recommendation. An example is shown below

Summary of Results

Initial Cost ($/lane mi)	$494,278	$581,363
Overlay Present Cost ($/lane mi)	$43,430	$0
Total Maintenance Present Cost ($/lane mi)	$0	$0
Salvage Present Value ($/lane mi)	$0	$0
Total Present Agency Unit Cost ($/lane mi)	$537,708	$581,363
Project Total Agency Present Cost ($/lane)	$3,656,415	$3,953,270

Recommendation:

Alternate pavement designs are recommended for the bidding process since the difference in life cycle costs is between 20 %.

If you want to include user's cost in the life cycle cost analysis, please go to RealCost© by clicking the right button. Check that RealCost.xls is under the same folder.

Go to RealCost

Total Cost	Flexibile Pavement			Rigid Pavement		
	Agency Cost ($1000)	User Cost ($1000)	Total Cost ($1000)	Agency Cost ($1000)	User Cost ($1000)	Total Cost ($1000)
Present Value	3656		3656	3953		3953
EUAC	211	0	211	229	0	229

Version 7.5, 12/31/2008

Print Report

Please note that if user costs are to be included, use the Realcost worksheet.