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City of Trinidad

Pavement Management Program
Final Report

Submitted to:

City of Trinidad

409 Trinity Street
Trinidad, CA 95570

January 2012

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Executive Summary

The City of Trinidad maintains approximately 3.3 centerline miles of paved streets. A pavement management system (PMS) is used to maintain this pavement network. Based on the results of a survey completed in Fall 2009, the current (2012) average pavement condition index (PCI) is 75, which is in the "good to excellent" condition category. A breakdown of the percentages of the County's network that fall into each condition category is found in Figure 1 below.

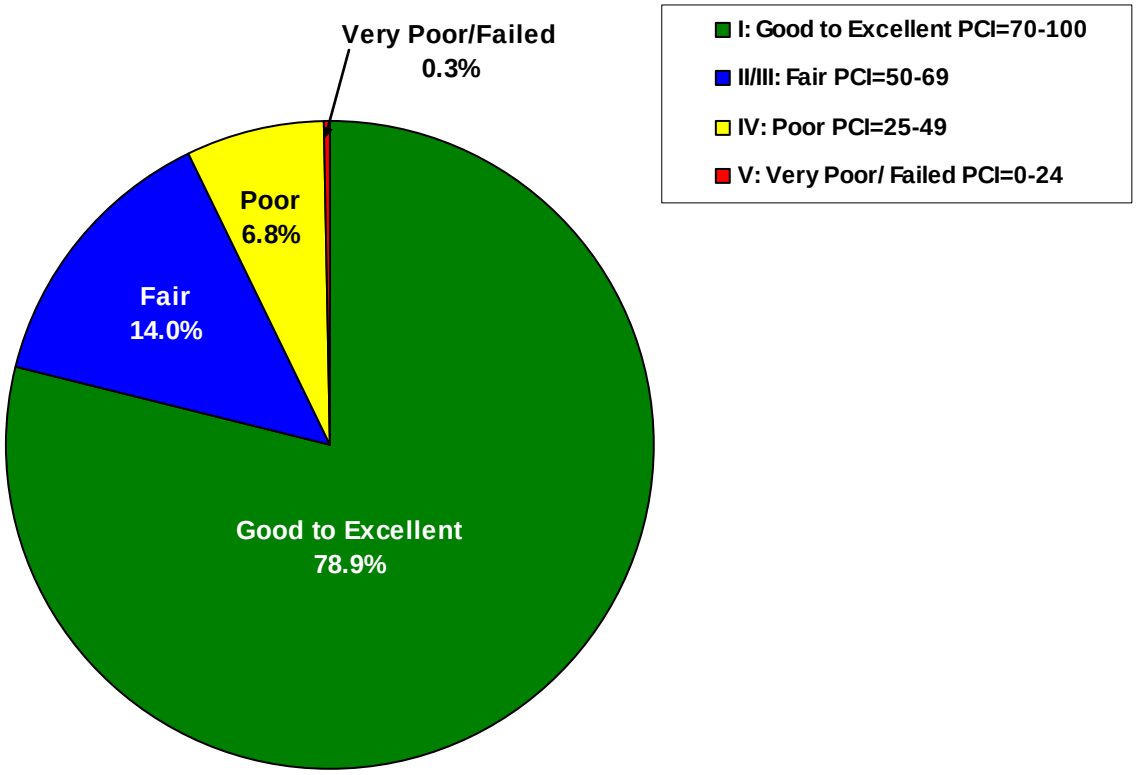

Figure 1. Pavement Condition Summary for City of Trinidad (2012)

This report is intended to assist HCAOG in making cost-effective decisions in managing and programming funding needs for the pavement network.

The pavement needs analysis shows that more than $544k is required over the next ten years to repair all the streets and improve the average PCI to 84 ("good to excellent" condition category). This will also eliminate the maintenance backlog.

Two funding scenarios were analyzed:

1. Maintain Current PCI at 75 – In order to maintain the current PCI at 75, an annual budget of $52k will be needed; however, the maintenance backlog will increase from $110k to $274k.

2. Unconstrained Needs Budget ($544k/10 yrs) – Under this budget scenario, the City's network condition will improve to 84 by 2021

Introduction

In 2009, the Humboldt County Association of Governments (HCAOG) selected Nichols Consulting Engineers (NCE) to implement a regional Pavement Management Program (PMP). This was intended to assist HCAOG member entities and Native American Tribes in determining roadway maintenance, rehabilitation, and reconstruction needs. This will also help to prioritize the pavement needs to maximize the efficient use of limited resources available.

In addition to Humboldt County, the following agencies were participants in this study:

- City of Eureka
- City of Arcata
- City of Blue Lake
- City of Ferndale
- City of Fortuna
- City of Rio Dell
- City of Trinidad
- Tribal Roads of Humboldt County

Background

A Pavement Management Program is designed to assist cities and counties in answering typical questions such as:

- What does the City's pavement network consist of? How many miles of streets are eligible for federal or state funds? How many are subjected to traffic from buses or heavy trucks?
- What is the existing condition of the pavement network? Is this an acceptable level for the City? If not, what is an acceptable level? How much additional funding is needed to achieve an acceptable level?
- Are there streets in specific areas that are much worse than others, and if so, how much worse?
- How will the condition of the pavement network respond over time under existing funding levels?
- What maintenance and rehabilitation strategies exist to improve current pavement conditions? What maintenance activities or treatments have occurred in the past on any given street?
- What impact would either additional funding or a decrease in funding, have on the condition of the overall pavement network?
- What is the backlog of maintenance and rehabilitative work that should be done? What are the future maintenance and rehabilitation needs? Are there different needs for different classes of streets i.e. arterials vs. residentials?
- Under different funding levels, what is the most cost-effective way to implement a multi-year capital improvement program? Maintenance work program?
- What are the street repair priorities, given different budgeting scenarios?

The City owns and maintains approximately 3.3 centerline miles of streets. The table below summarizes the pavement network by functional class.

Table 1. Breakdown of Street Network By Functional Class

Functional Class	Centerline Miles	Lane Miles	# of Sections
Residential/Local	3.2	6.5	27
Rural Minor Arterial	0.1	0.1	1
Totals	**3.3**	**6.6**	**28**

The cost to replace this street network is estimated at $1.8M, which represents a portion of the City's investment in transportation infrastructure. This cost includes the replacement of the pavement structure from the subgrade to the wearing surface as well as ancillary items.

A maintenance and rehabilitation strategy was developed after discussions with the City of Rio Dell in spring 2011, and the unit costs were based on the actual construction bids received on paving projects from 2007-2011 that were provided by the City. Then, a budget needs analysis was performed. In addition, two budgetary scenarios were analyzed. This report presents the results of our analyses.

Purpose

This report links the PMP's recommended repair program costs to the City's projected budget alternatives to improve overall maintenance and rehabilitation strategies. This report assesses the adequacy of projected revenues to meet the maintenance needs recommended by the PMP. It also maximizes the return from expenditures by:

1. implementing a multi-year street rehabilitation and maintenance program;
2. developing a preventative maintenance program; and
3. selecting the most cost effective repairs.

This study examines the overall condition of the street network and highlights options for improving the current network level pavement condition index (PCI). These options are developed by conducting "what if" scenarios using HCAOG's pavement management system database. By varying the budget amounts available for pavement M&R, one can show how different funding strategies can impact the City's streets over the next ten years.

Existing Pavement Condition

The pavement condition index, or PCI, is a measurement of pavement grade or condition and ranges from 0 to 100. A newly constructed street would have a PCI of 100, while a failed street would have a PCI of 10 or less. **City's average 2012 PCI is 75, which is in the "fair" category.** A detailed PCI report which includes all the Streets in City of Trinidad is presented in Appendix A. A description of the various M&R strategies available for the City follow are listed in Appendix B. Figure 2 illustrates the different pavement condition categories below – these follow industry standards and are widely used throughout California and the United States.

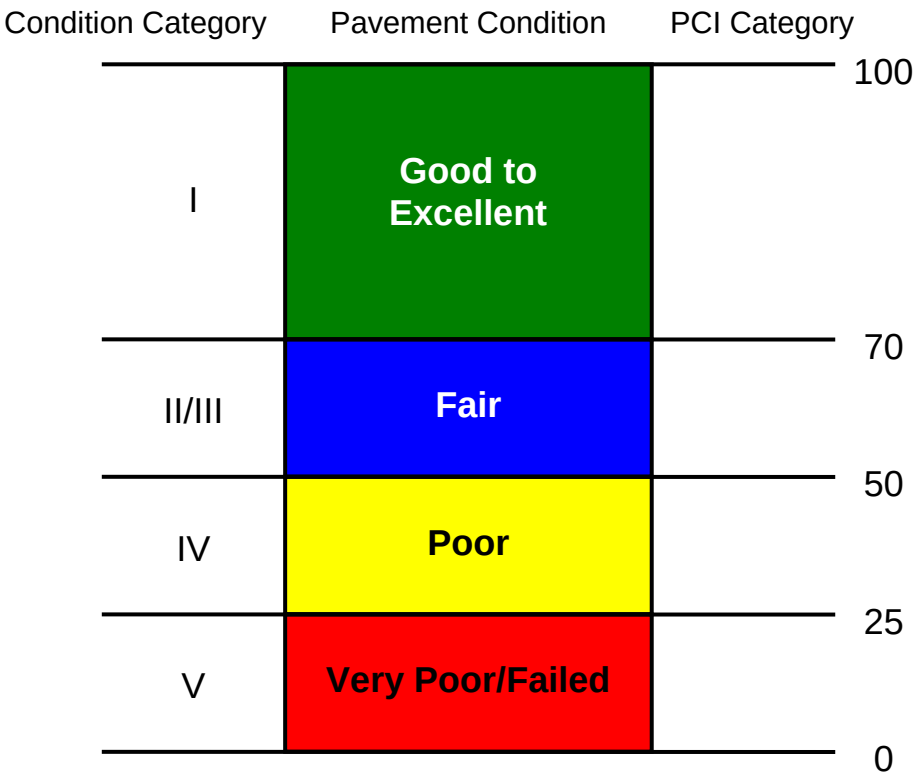

Figure 2. Pavement Condition Categories by PCI

A brief description of each condition category is summarized as follows:

- Category I: Pavements which have little or no distress. A pavement in this category may be described as “excellent” or “very good”. An example in this category is Ewing Street beginning at Edwards Street toward end, which has a PCI of 95.

- Category II: Pavements which have a significant level of distress that are predominantly non-load related. A pavement in this category may be described as “fair”. An example in this category is Lanford Road beginning at Scenic Drive toward end, which has a PCI of 63.

- Category III: Pavements which have a significant level of distress that are predominantly load related. A pavement in this category may be described as “fair”. An example is Patricks Point Drive beginning at Main Street toward City Limit, which has a PCI of 55.

- Category IV: Pavements which have a major distress. A pavement in this category may be described as “poor”. An example is Edwards Street between Trinity Street and Ocean Avenue, which has a PCI of 38.

- Category V: Pavements which have an extensive amount of distress. A pavement in this category may be described as “very poor or failed”. An example is Azalea Way between Pacific Court and Edwards Street, which has a PCI of 16.

The reason to separate streets with a PCI between 50 and 70 into either Category II or III is because the repair strategies are very different. A Category III repair will usually address structural failures and will cost more than a Category II repair.

Pavement management information from regional agencies was collected to gauge City's condition against the region. PCI data was collected for seven agencies: the Humboldt County, the City of Arcata, Eureka, Blue Lake, Fortuna, Ferndale, and Rio Dell. The tribal roads have not yet been included in this part of the study. The PCI comparisons are shown in Figure 3.

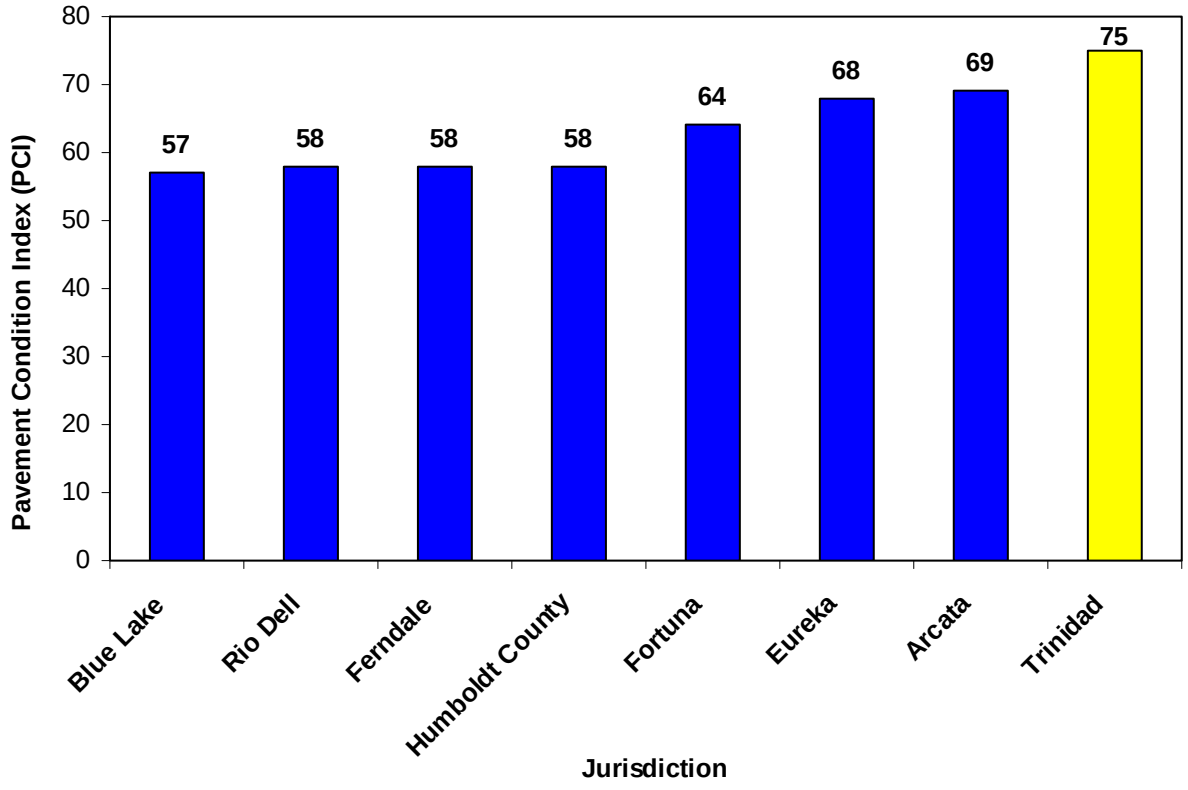

Figure 3. PCI Comparison with Seven Regional Jurisdictions

Approximately 78.9% of the City's pavement area is in the "good to excellent" condition category; about 20.8% of the pavement area falls in the "poor or fair" category and about 0.3% of the network falls in the "failed" category (see Figure 4 below). Detailed PCI results can be found in Appendix A.

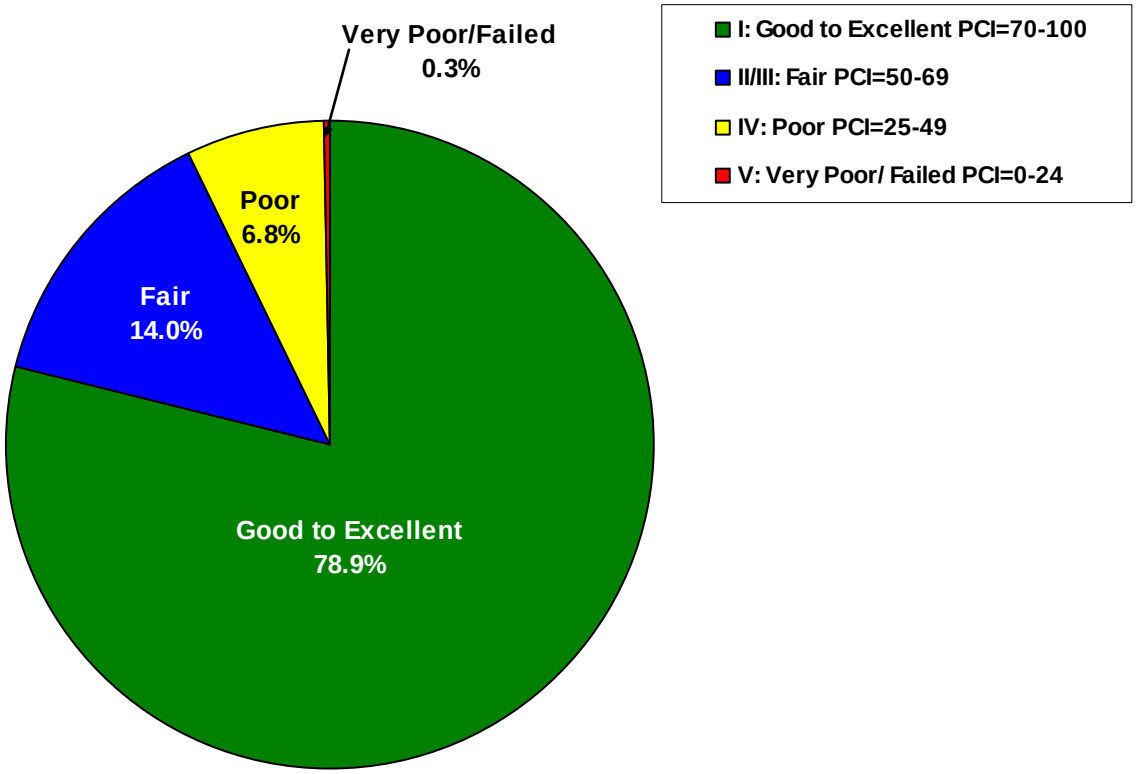

Figure 4. Pavement Condition Summary for City of Trinidad (2012)

Budget Needs

It is well documented that it costs less to maintain streets in good condition than streets in bad condition. Therefore, the StreetSaver program strives to develop a maintenance and rehabilitation (M&R) strategy that will improve the overall condition of the network to an optimal PCI somewhere around the 80's. The City's current **average network PCI is 75**, and a significant portion of the network suffers from load-related distresses. If these issues are not addressed, the quality of the street network will inevitably decline. In order to correct these deficiencies, a cost-effective funding and M&R strategy should be implemented.

The first step is to determine the maintenance "needs" of the pavement network. Using the budget needs module, the M&R needs over the next ten years were estimated at approximately $544k for the City. If the City follows the M&R strategy presented in Appendix B and prioritization strategy recommended in the program, the average network PCI will increase to 84. This is the level at which it is most cost-effective to maintain the pavements with preventive maintenance strategies. If, however, no maintenance or rehabilitation is applied over the next ten years, already distressed streets will continue to deteriorate, and the network PCI will drop to 57. The results of the budget needs analysis are summarized in Table 2 below.

Table 2. Summary of Results from Needs Analysis

Year	2012	2013	2014	2015	2016	2017
PCI with treatment	84	84	85	84	84	82
PCI without treatment	74	72	71	69	67	65
Rehabilitation ($ k)	121	54	91	18	51	0
Preventive Maintenance ($ k)	40	0	0	0	0	0
Budget Needs ($ k)	161	54	91	18	51	0

Year	2018	2019	2020	2021	Total
PCI with treatment	80	79	86	84	
PCI without treatment	63	61	59	57	
Rehabilitation ($ k)	0	0	99	0	434
Preventive Maintenance ($ k)	0	2	62	5	110
Budget Needs ($ k)	0	2	162	5	544

The results of the budget needs analysis represent the ideal funding strategy recommended by StreetSaver. Of the $544k in M&R needs shown, approximately $110k (20%) is earmarked for preventative maintenance or life-extending treatments, while the rest (80%) is allocated for more costly rehabilitation and reconstruction treatments.

Impacts of Projected Funding Levels

Using the StreetSaver budget scenario modules, both the overall PCI for the pavement network as well as the amount of unfunded maintenance backlog can be evaluated for a given funding level over a period of time. The unfunded backlog consists of pavement M&R that is needed, but cannot be addressed due to lack of funding. Shrinking budgets have forced many cities to defer much-needed street maintenance. By deferring M&R, not only does the frequency of citizens' complaints about the condition of the network increase, but also the cost to repair these streets increases as well.

Figure 5 demonstrates the old colloquial saying of “pay me now, or pay more later”. History has shown that it costs less to maintain streets in good condition than to repair streets that have failed. By allowing pavements to deteriorate, streets that once cost only $1.30 to $1.40 per square yard to surface seal may soon cost $16.90 to $38.00 per square yard to overlay and upwards of $67.10 per square yard to reconstruct.

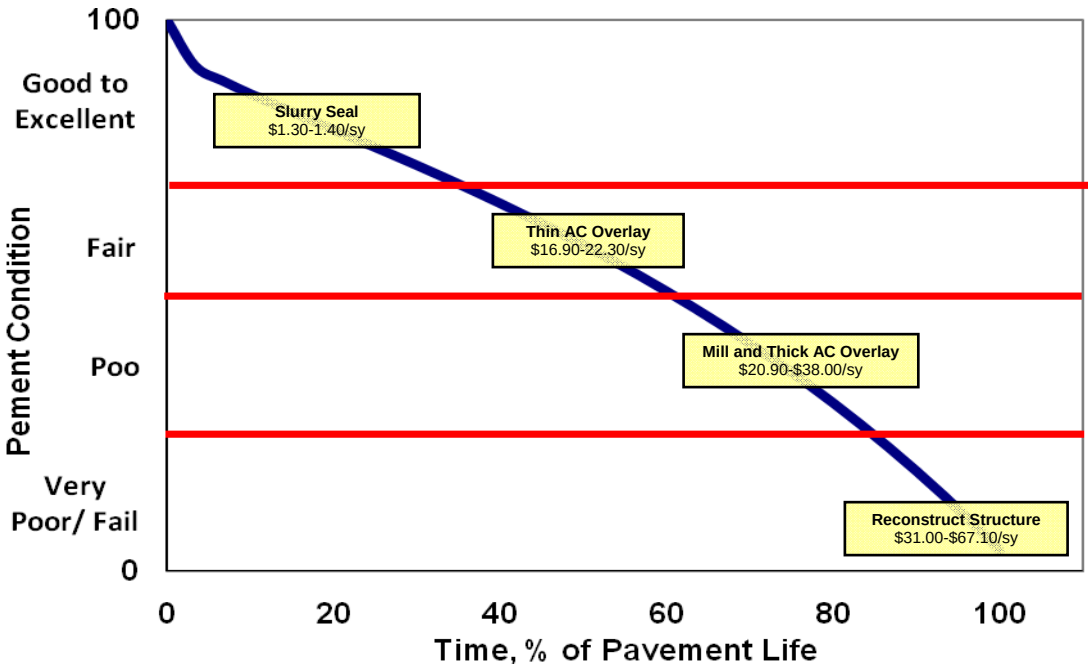

Figure 5. Cost to Maintain a Pavement Over Time

Budget Scenarios

Having determined the maintenance needs of the street network, the next step in developing a cost-effective M&R strategy is to conduct several what-if analyses. Using StreetSaver's budget scenario module, the impacts of various budget scenarios can be evaluated. The program forecasts the effects of the different scenarios on PCI and deferred maintenance (backlog). By examining the effects on these indicators, the advantages and disadvantages of different funding levels and maintenance strategies become clear. The following scenarios were performed for this report at the request of the HCAOG based on current and projected funding programs to ensure that the PMP is a useful document regardless of funding modifications.

Scenario 1. Maintain Current PCI at 75 ($52k per year) – $52k per year will be needed in order to maintain the current PCI of the network at 75. The deferred maintenance backlog will increase from $110k to $274k.

Scenario 2. Unconstrained Needs Budget ($544k over ten years) – In this scenario, this level of funding will eliminate the deferred maintenance backlog and the PCI will reach 84 by 2021.

Scenario 1. Maintain Current PCI at 75 ($52k per year)

In order to maintain the current condition of the network at PCI of 75, $52k per year will be needed. The deferred maintenance backlog will continue to increase from $110k to $274k. Approximately 78.8% of the network will be in the good or excellent condition category, while none of the management sections will still remain in the "failed" category. Although the network PCI remains at 75, it can be seen that the deferred maintenance backlog will still increase. This is because the available budget is only enough to keep good streets in good condition but is not sufficient to also repair those streets that fall into categories IV. Candidate streets for maintenance and rehabilitation are listed in Appendix D.

Table 3. Summary of Results for Scenario 1

Year	2012	2013	2014	2015	2016	2017
Budget ($ k)	52	52	52	52	52	52
Rehabilitation ($ k)	42	19	41	18	51	42
Preventive Maintenance ($ k)	9	32	1	0	0	9
Deferred Maintenance ($ k)	110	118	173	182	101	110
PCI	78	80	80	79	79	78
Year	**2018**	**2019**	**2020**	**2021**	**Total**	
Budget ($ k)	52	52	52	52	520	
Rehabilitation ($ k)	0	0	0	41	260	
Preventive Maintenance ($ k)	0	2	8	9	61	
Deferred Maintenance ($ k)	62	65	99	274		
PCI	77	76	75	75		

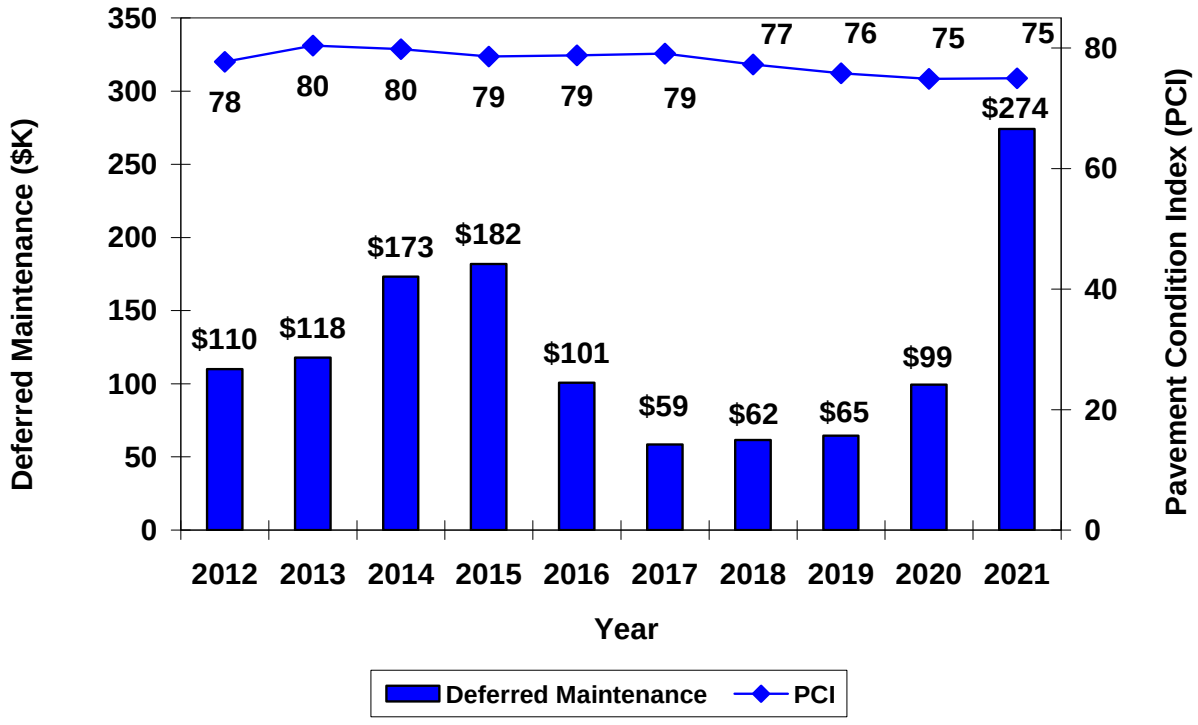

Figure 6. PCI vs. Deferred Maintenance for Scenario 1: Maintain Current PCI

Scenario 2. Unconstrained Needs Budget ($544k over ten years)

In this scenario, the funding level is approximately $544k over ten years. As a consequence, the City's network condition will increase from the current PCI of 75 to 84 by 2021. Also, the deferred maintenance backlog will be eliminated. Candidate streets for maintenance and rehabilitation are listed in Appendix D.

Table 4. Summary of Results for Scenario 3

Year	2012	2013	2014	2015	2016	2017
Budget ($ k)	161	54	91	18	51	0
Rehabilitation ($ k)	121	54	91	18	51	0
Preventive Maintenance ($ k)	40	0	0	0	0	0
Deferred Maintenance ($ k)	0	0	0	0	0	0
PCI	84	84	85	84	84	82
Year	**2018**	**2019**	**2020**	**2021**	**Total**	
Budget ($ k)	0	2	162	5	544	
Rehabilitation ($ k)	0	0	99	0	434	
Preventive Maintenance ($ k)	0	2	62	5	110	
Deferred Maintenance ($ k)	0	0	0	0		
PCI	80	79	86	84		

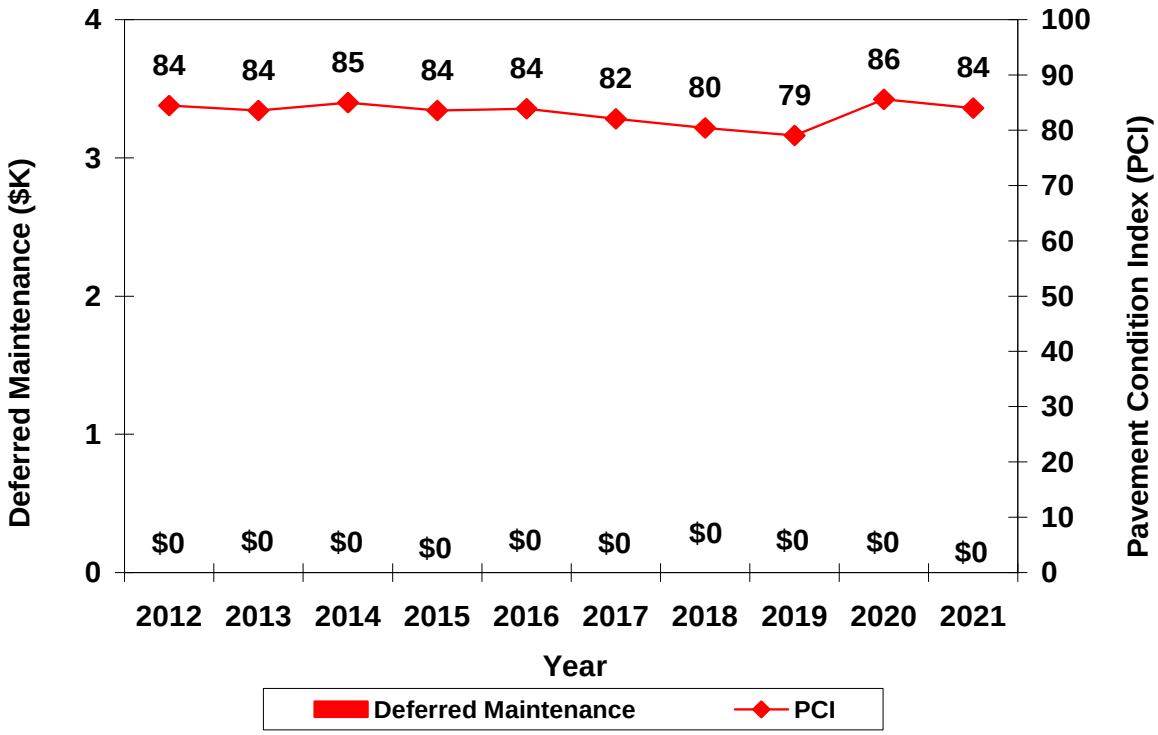

Figure 7. PCI vs. Deferred Maintenance for Scenario 2: Needs Budget ($544k over ten years)

Discussion

Figure 8 illustrates the change in PCI over time for the different budget scenarios. Note that Scenario 1 ($52k per year) will maintain the average network PCI at 75 over the next 10 years. Scenario 2 ($544k/10yrs) will see an increase in the PCI to 84 by 2021.

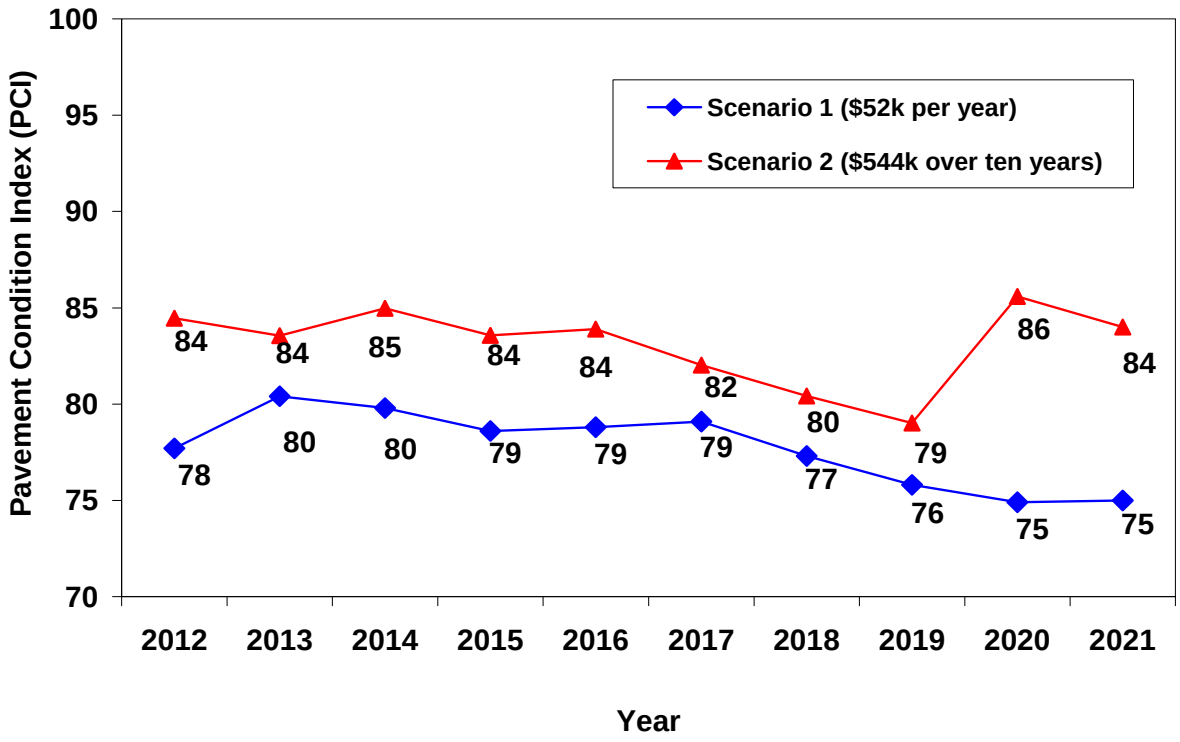

Figure 8. Pavement Condition Index by Scenario by Year

Figure 9 illustrates the change in deferred maintenance over time for the different budget scenarios. Note that Scenario 1 (Maintain PCI at 75) will still see an increase in the deferred maintenance even though the PCI remains about the same. This indicates that a constant PCI does not also mean that the unfunded backlog is stable. The reason is because funds are allocated to preserve all the good streets first (i.e. where the PCI > 70). Any streets with a PCI <70 will continue to deteriorate, and their deferred costs to repair will continue to increase, and the unfunded backlog will continue to grow.

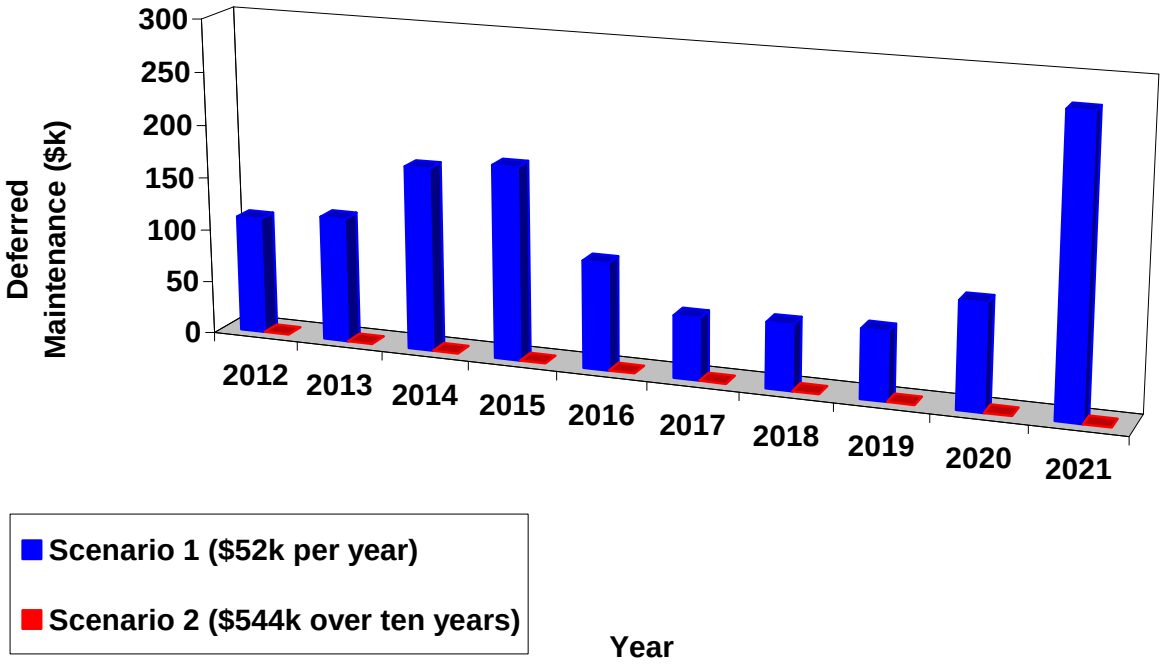

Figure 9. Deferred Maintenance Backlog by Scenario by Year

Conclusions

City of Trinidad currently has a paved street network of 3.3 centerline miles or 6.6 lane miles. Overall, the roadwork network that was surveyed is in "good to excellent" condition with an average PCI of 75. Approximately 78.9% are in the "Good to Excellent" condition category; however, about 7.1% of the network also falls into the poor and failed categories, which require a budget of $544k over the next ten years to restore these pavements.

The level of funding has to be compared with results of this report to make a better policy in next ten years. Obviously, shrinking the budget will not provide sufficient money to meet the City's needs both in the short and long terms. If more funding is not made available then the City's streets will only deteriorate further and will only make it that much more difficult to show any signs of improvement.

Statewide, there are a large variety of local funding sources that cities and counties rely on. They include:

- General funds
- Local sales taxes
- Developer impact fees
- Various assessment districts – lighting, special assessment
- Community services districts
- Redevelopment agencies
- Traffic impact fees
- Traffic safety/circulation fees
- Utility taxes/fees
- Transportation mitigation fees
- Parking and various permit fees
- Tribal funds
- Traffic safety fines
- Fines and forfeitures
- Interest income
- Landfill mitigation
- Landscape funding plan
- Local Transportation Fund (LTF)
- Property taxes
- Storm drain fund
- Tolls
- Tobacco settlement funds

The City is strongly encouraged to consider additional sources of funding for the pavement network.

Glossary

Deferred Maintenance	This is maintenance work that is deferred to a future budget cycle, or postponed until funds are available. The failure to perform needed repair, maintenance, and renewal by normal maintenance management creates deferred maintenance, also called “Backlog”.
Functional Class	Defines the primary function of a particular pavement section. The four classes are: A (Arterial), C (Collector), R (Residential), and O (Other).
Network	All the streets in the City that includes arterial, collector, and residential streets.
PCI	Pavement Condition Index - measured on a scale of 0 (failed) to 100 (excellent), PCIs can be calculated from inspection units and applied maintenance treatments.
PMP	Pavement Management Program
PM%	Percentage of each year’s budget that has been set aside for preventive maintenance activities such as slurry seals.
Preventative Maintenance	These are treatments that are applied to pavements with a PCI greater than 70. They include treatments such as crack seals or slurry seals and are intended to preserve the pavement. However, it does not extend the structural service life of the pavement.
Rehabilitation	These are treatments that are applied for pavements with a PCI less than 70. Typically, they include overlays and reconstruction and are intended to extend the structural life of the pavement.
Replacement Cost	Cost to replace the entire pavement structure *e.g.* asphalt concrete and aggregate base.
Treatment	Repair activities that are applied to restore either the functional or structural deficiencies of the pavement.

Appendix A: Inventory & PCI Summary

City of Trinidad
Pavement Management Program
Inventory and PCI Summary

Area	Street ID	Section ID	Street Name	Begin	End	Length	Width	FC	ST	PCI Date	PCI
Trinidad	T-AZAWAY	010	AZALEA WAY	PACIFIC CT	EDWARDS ST	122	11	R	A	10/19/2009	16
Trinidad	T-BERRRD	010	BERRY ROAD	TRINIDAD FRONTAGE RD	NE END	1,085	16	R	A	10/19/2009	82
Trinidad	T-EASTST	010	EAST STREET	OCEAN AVE	VIEW AVE	353	21	R	A	10/19/2009	85
Trinidad	T-EDWAST	010	EDWARDS STREET	SW END	PIER PARKING LOT	701	30	R	A	10/19/2009	95
Trinidad	T-EDWAST	020	EDWARDS STREET	GALINDO ST	HECTOR ST	710	30	R	A	10/19/2009	77
Trinidad	T-EDWAST	030	EDWARDS STREET	HECTOR ST	TRINITY ST	302	36	R	A	10/19/2009	95
Trinidad	T-EDWAST	040	EDWARDS STREET	TRINITY ST	OCEAN AVE	316	34	R	A	10/19/2009	38
Trinidad	T-EWINST	010	EWING STREET	EDWARDS ST	N END	479	18	R	A	10/19/2009	95
Trinidad	T-GALIST	010	GALINDO STREET	VAN WYCKE ST	EDWARDS ST	289	22	R	A	10/19/2009	76
Trinidad	T-HECTST	010	HECTOR STREET	EDWARDS ST	UNDERWOOD ST	358	18	R	A	10/19/2009	87
Trinidad	T-H101UP	010	HIGHWAY 101 UNDER PASS	HIGHWAY 101 SB OFF RAMP	HIGHWAY 101 NB OFF RAMP	304	26	R	A	10/19/2009	49
Trinidad	T-HIMADR	010	HIMALAYA DRIVE	BERRY RD	E END	640	17	R	A	10/19/2009	81
Trinidad	T-LANFRD	010	LANFORD ROAD	SCENIC DR	N CDS	995	17	R	A	10/19/2009	63
Trinidad	T-MAINST	010	MAIN STREET	TRINITY ST	HIGHWAY 101 SB OFF RAMP	1,023	38	R	A	10/19/2009	82
Trinidad	T-OCEAVE	010	OCEAN AVENUE	EDWARDS ST	MAIN ST	919	21	R	A	10/19/2009	82
Trinidad	T-PARKST	010	PARKER STREET	HECTOR ST	TRINITY ST	325	24	R	A	10/19/2009	85
Trinidad	T-PAPODR	010	PATRICKS POINT DRIVE	MAIN ST	N CITY LIMIT	294	31	R	A	10/19/2009	55
Trinidad	T-SCENDR	010	SCENIC DRIVE	MAIN ST	LANFORD RD	1,665	22	R	A	10/19/2009	95
Trinidad	T-SCENDR	020	SCENIC DRIVE	LANFORD RD	S CITY LIMIT	1,563	22	R	A	10/19/2009	72
Trinidad	T-STAGRD	010	STAGECOACH ROAD	MAIN ST	N CITY LIMIT	172	20	R	A	10/19/2009	95
Trinidad	T-STPARD	010	STATE PARK ROAD	W END	STAGECOACH RD	871	20	R	A	10/19/2009	76
Trinidad	T-TRFRRD	010	TRINIDAD FRONTAGE ROAD	WESTHAVEN DR	BERRY RD	398	31	R	A	10/20/2009	80
Trinidad	T-TRINST	010	TRINITY STREET	EDWARDS ST	MAIN ST	891	35	R	A	10/19/2009	78
Trinidad	T-UNWDDR	010	UNDERWOOD DRIVE	N END	HECTOR ST	829	14	R	A	10/19/2009	79
Trinidad	T-VAWYST	010	VAN WYCKE STREET	EDWARDS ST	E END	535	16	R	A	10/19/2009	86
Trinidad	T-VIEAVE	010	VIEW AVENUE	EAST ST	MAIN ST	760	23	R	A	10/19/2009	84
Trinidad	T-WESTST	010	WEST STREET	TRINITY ST	OCEAN AVE	306	20	R	A	10/19/2009	60
Trinidad	T-WESTDR	010	WESTHAVEN DRIVE	HIGHWAY 101 NB OFF RAMP	E CITY LIMIT	303	28	RMiA	A	10/19/2009	85

Appendix B: M&R Treatment Description

Brief Description of Maintenance and Rehabilitation Treatments

Crack Sealing

Crack Sealing is the placement of polymerized/rubberized asphalt materials into cracks that bond to the crack walls and move with the pavement. This technique is used to fill longitudinal and transverse cracks, including joint reflection cracks from underlying PCC slabs that are 1/8" to ½" wide. The primary purpose of crack sealing in Asphalt Concrete (AC) pavement is to prevent surface water infiltration into the substructure of pavement and to prevent the debris stay in the cracks. It is more cost effective to use this technique as preventative maintenance when the overall pavement condition is in good condition. Sealing cracks on a deteriorated pavement surface is not cost effective and will not provide any structural benefit to the road.

Fog seal

A Fog seal involves the spraying of a light coat of a bituminous material (typically 0.03 to 0.05 gallon per square yard) on the surface of an existing pavement using a distributor. It is used to reduce raveling while also improving waterproofing. Fog seals are especially good for treating pavements that carry light traffic such as parking lots.

Slurry seals

A slurry Seal consists of a graded aggregate, asphalt emulsion, mineral filler, water, and additives. It is a hard wearing surface for pavement preservation. Slurry Seals are used primarily on aged and raveled pavements, filling minor cracks, restoring skid resistance and adding aesthetic appeal. It may be used on low volume streets and parking lots. Larger cracks need to be individually treated before the application of a slurry seal. The surface is smoother than a chip seal treatment and is more "surface friendly". In general, slurry seal can be categorized into three types which depend on the maximum aggregate size in the mix. Type I slurry seals usually contain maximum aggregate size of 1/8"; Type II slurry seals usually contain maximum aggregate size of ¼"; and Type III slurry seals usually contain maximum aggregate size of 3/8".

Scrub seals

A scrub seals are a polymer modified asphalt layer applied to an asphalt pavement surface and scrubbed into the cracks and voids with a broom. A layer of sand or small aggregate is then applied over the asphalt and then scrubbed over again, forcing the mix into the cracks and voids to form a seal. It is used to fill and seal small cracks and voids, as well as to enrich hardened/oxidized asphalt. Many contractors are still unfamiliar with the scrub seal method, so tests may be needed to determine what emulsion or polymer-modified emulsion would work with the brooms.

Chip seal

Chip seals are the application of asphalt and aggregate chips rolled onto the pavement. In the United States, chip seals are typically used on rural roads carrying lower traffic volumes. It is used to seal the surface of a pavement with non-load associated cracks, and to improve surface friction. During the treatment, the roadway can be opened to low-speed traffic just after the application of the aggregate. However, it requires constant attention and frequent adjustment of aggregate application rates to minimize chip loss, loose aggregates, and bleeding. Windshields can be damaged by the loose aggregate

before the excess is removed and dust can be created during the brooming of the loose aggregate. Double chip seals are common for more high volume roads.

Cape Seals

A cape is the application of a chip seal followed by a slurry seal or microsurfacing within a few days of the initial treatment. Cape Seals are used where a chip seal is too rough and when a smooth finish is required e.g. in the residential streets. In instances where cracking is a problem, a polymer or asphalt rubber modified chip seal can alleviate cracking and the slurry provides the smooth surface. It can increase the life of a chip seal by enhancing binding of the chips and by protecting the surface.

Microsurfacing

Microsurfacing consists of graded aggregates, asphalt emulsion, mineral filler, water and other additives. Compare to slurry seal, microsurfacing uses better quality aggregates and a fast setting emulsion of higher stiffness allowing thicker layers to be placed. Thus, it is usually used in the more specialized slurry jobs of rut filling, restoring surface profiles, and for roads that sustain heavy traffic. It also has quicker cure time, but the cost is higher than a slurry or chip seal treatment.

Ultrathin Bonded Wearing Surface

An ultrathin bonded wearing surface is a specially formulated thin asphalt mix overlay. Ultra-thin bonded wearing surface is placed with a specially built machine that places a thick layer of oil and asphalt in a single pass. The heavy oil application seals small cracks in the existing pavement and helps to ensure the adhesion of the asphalt to the underlying pavement. The ultrathin mat, usually ranges from ½ to 3/4 inches thick. The treatment is primarily used to provide a durable, friction resistant surface on existing pavement, without the expense of milling the existing asphalt. But the cost for this application is high, and it needs special construction equipment.

Hot-Mix Asphalt (HMA) Overlay

This technique involves adding an HMA layer to an existing HMA or PCC pavement. It is used to correct or improve the structural capacity or functional requirements such as skid resistance and ride quality. The use of an HMA overlay is usually more economic when the existing pavement is still in good to fair condition. An overlay may be combined with other M&R methods such as cold milling, cold recycling, hot recycling, and heater scarification. The thickness of the new surface will be dependent on the type, severity and extent of the pavement surface distresses, the ride quality and the required structural improvement necessary to accommodate the design traffic.

Rubberized Hot-Mix Asphalt (RHMA)

Rubberized hot-mix asphalt concrete (RHMA) is a road paving material made by blending ground-up recycled tires with asphalt to produce a binder which is then mixed with conventional aggregate materials. This mix is then placed and compacted into a road surface. There are two primary types of binders for RHMA, asphalt-rubber and terminal blend. Asphalt-Rubber is a blend of paving grade asphalt cement, ground recycled tire rubber and other additives, as needed, for use as binder in pavement construction. The rubber shall be blended and interacted in the hot asphalt cement sufficiently to cause swelling of the rubber particles prior to use. The asphalt-rubber binder is field blended (at the hot mix plant) and requires specialized mobile mixing

equipment to produce. Typical crumb rubber modifier (CRM) content for asphalt-rubber ranges from 18-22 percent. The crumb rubber modifier used in asphalt-rubber is in the 10-16 mesh range. Terminal blends. are binder materials that use finely ground (less than 30 mesh) crumb rubber modifier and are typically blended at the asphalt refinery. Historically, terminal blend binders contained 10 percent or less crumb rubber modifier. However, in recent years the crumb rubber modifier content has been increased to 15-20 percent in some projects. The major advantages of using the RHMA are better resistance to reflective cracking and more environmental friendly which help to use recycled tires.

Reconstruction

Reconstruction, which might be considered as the ultimate or extreme rehabilitation treatment, consists of the removal of the pavement structure which can go down to the subgrade, reworking and recompacting the subgrade, and completely replacing the pavement layers with new, or recycled materials, or a combination thereof.

Cold In-Place Recycling

Cold in-place recycling involves cold milling of the pavement surface, addition of emulsified asphalt, Portland cement or other modifiers to improve the properties of the original asphalt concrete mix followed by screeding and compaction of the reprocessed material in one continuous operation. The use of cold in-place recycling can restore old pavement to the desired profile, eliminate existing wheel ruts, restore the crown and cross slope, and eliminate pothole, irregularities and rough areas. It can also eliminate transverse, reflective, and longitudinal cracks. The major advantages for the cold in-place recycling are the potential of cost savings, minimum traffic disruption, ability to retain original profile, reduction of environmental concerns, and a growing concern for depleting petroleum reserves. However, cold in-place recycled pavements require a new wearing surface to be placed as a seal and to restrict moisture intrusion.

Full Depth Reclamation

This rehabilitation technique is often used for pavements exhibiting extensive distress. It involves pulverization of the pavement surface layers and a portion of the granular base for depths of up to 7.8 inches or more. The resulting mixture of asphalt concrete materials and granular or treated (i.3., soil cement) base can then be compacted and used as a granular base or sub-base for the new pavement. It can also be stabilized using bituminous materials, Portland cement, lime and calcium chloride. New granular base material can be added to improve the structural capacity of the pavement followed by the placement of a new riding surface. Advantages of this technique include the reuse of the existing pavement materials and the elimination of potential reflection cracking from and old asphalt concrete layer through the new pavement surface layer.

Perpetual Pavement

Perpetual pavement is defined as an asphalt pavement designed and built to last longer than 50 years without requiring major structural rehabilitation or reconstruction, and needing only periodic surface renewal in response to distresses confined to the top of the pavement. The basic concept is that HMA pavements over a minimum strength are not likely to exhibit structural damage even when subjected to very high traffic flows over long periods of time. Rather, deterioration seems to initiate in the pavement surface as either top-down cracking or rutting. If surface-initiated cracking and rutting can be

detected and remedied before they impact the structural integrity of the pavement, the pavement design life could be greatly increased.

Warm Mix Asphalt

Warm mix asphalt is the same as conventional asphalt except it has lower mixing temperature (30 to 100ºF lower than hot-mix asphalt). This is achieved by various mechanical and chemical methods to reduce the shear resistance of the mix at the construction temperature while reportedly maintaining or improving pavement performance. The major advantage of warm mix asphalt includes lower fumes emissions, lower energy consumption, lower plant wear consumption, decreased binder aging, early site opening, cool weather paving, and compaction aid for stiff mixes. Currently available warm mix technologies include WAM Foam, Zeolite, Sasobit and Evotherm.

Foam Asphalt

Foamed asphalt is formed by combining hot asphalt binder with small amounts of cold water. When the cold water comes in contact with the hot asphalt binder it turns to steam, which becomes trapped in tiny asphalt binder bubbles. The result is a thin-film, high volume asphalt foam that bitumen has a very large surface area and extremely low viscosity making it ideal for mixing with aggregates. The advantages of using foam asphalt includes increases the shear strength and reduces the moisture susceptibility of granular materials, lower binder and transportation costs, saving in time, energy conservation, and wider temperature workability.

Reference:

- Ralph Haas, *Pavement Design and Management Guide*, , Transportation Association of Canada, 1997
- M. Y. Shahin, *Pavement Management for Airports, Roads, and Parking Lots*, Springer Science + Business Media, LLC, 2005
- Muthen, K.M. Foamed Asphalt Mixes-Mix Design Procedure." *Transportation Research Record* 898, pp. 290-296.
- Warm Mix Asphalt Technical Working Group, http://www.warmmixasphalt.com/AboutWma.aspx

Appendix C: M&R Decision Tree

Decision Tree

Printed: 01/04/2012

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Arterial	AC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$1.40		7	
			Restoration Treatment	2.5" AC OVERLAY	$22.50			2
		II - Good, Non-Load Related		2.5"AC OVERLAY W/ DIGOUTS	$25.10			
		III - Good, Load Related		2.5"AC OVERLAY W/ DIGOUTS	$27.50			
		IV - Poor		3"AC OVERLAY W/ DIGOUTS	$38.00			
		V - Very Poor		RECONSTRUCT SURFACE (8" AC)	$67.10			
	AC/AC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$1.40		7	
			Restoration Treatment	2.5"AC OVERLAY W/ DIGOUTS	$22.50			2
		II - Good, Non-Load Related		2.5"AC OVERLAY W/ DIGOUTS	$25.10			
		III - Good, Load Related		2.5"AC OVERLAY W/ DIGOUTS	$27.50			
		IV - Poor		3"AC OVERLAY W/ DIGOUTS	$38.00			
		V - Very Poor		RECONSTRUCT SURFACE (8" AC)	$67.10			
	AC/PCC	I - Very Good	Crack Treatment	SEAL CRACKS	$0.60	3		
			Surface Treatment	SINGLE CHIP SEAL	$0.74		6	
			Restoration Treatment	MILL AND THICK OVERLAY	$7.23			2
		II - Good, Non-Load Related		DOUBLE CHIP SEAL	$1.52			
		III - Good, Load Related		HEATER SCARIFY & OVERLAY	$5.95			
		IV - Poor		HEATER SCARIFY & OVERLAY	$6.14			
		V - Very Poor		RECONSTRUCT SURFACE (AC)	$14.00			
	PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		99	
			Restoration Treatment	DO NOTHING	$0.00			100
		II - Good, Non-Load Related		DO NOTHING	$1.11			
		III - Good, Load Related		DO NOTHING	$1.51			
		IV - Poor		THICK AC OVERLAY(2.5 INCHES)	$1.92			
		V - Very Poor		RECONSTRUCT STRUCTURE (AC)	$14.00			

Functional Class and Surface combination not used

Decision Tree

Printed: 01/04/2012

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Arterial	ST	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	DO NOTHING	$0.00		99	
			Restoration Treatment	DO NOTHING	$0.00			100
		II - Good, Non-Load Related		SINGLE CHIP SEAL	$1.11			
		III - Good, Load Related		SINGLE CHIP SEAL	$1.51			
		IV - Poor		SINGLE CHIP SEAL	$1.92			
		V - Very Poor		THICK AC OVERLAY(2.5 INCHES)	$7.67			

Functional Class and Surface combination not used

Decision Tree

Printed: 01/04/2012

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Collector	AC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$1.30		7	
			Restoration Treatment	2.5"AC OVERLAY W/ DIGOUTS	$20.90			2
		II - Good, Non-Load Related		2.5"AC OVERLAY W/ DIGOUTS	$22.80			
		III - Good, Load Related		2.5"AC OVERLAY W/ DIGOUTS	$24.20			
		IV - Poor		2.5"AC OVERLAY W/ DIGOUTS	$28.60			
		V - Very Poor		RECONSTRUCT SURFACE (6" AC)	$48.40			
	AC/AC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$1.30		7	
			Restoration Treatment	2.5"AC OVERLAY W/ DIGOUTS	$20.90			2
		II - Good, Non-Load Related		2.5"AC OVERLAY W/ DIGOUTS	$22.80			
		III - Good, Load Related		2.5"AC OVERLAY W/ DIGOUTS	$24.20			
		IV - Poor		2.5"AC OVERLAY W/ DIGOUTS	$28.60			
		V - Very Poor		RECONSTRUCT SURFACE (6" AC)	$48.40			
	AC/PCC	I - Very Good	Crack Treatment	SEAL CRACKS	$0.60	4		
			Surface Treatment	SINGLE CHIP SEAL	$0.74		7	
			Restoration Treatment	MILL AND THIN OVERLAY	$5.04			3
		II - Good, Non-Load Related		DOUBLE CHIP SEAL	$1.52			
		III - Good, Load Related		HEATER SCARIFY & OVERLAY	$5.95			
		IV - Poor		HEATER SCARIFY & OVERLAY	$6.14			
		V - Very Poor		RECONSTRUCT STRUCTURE (AC)	$11.38			
	PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	DO NOTHING	$0.00		99	
			Restoration Treatment	DO NOTHING	$0.00			100
		II - Good, Non-Load Related		DO NOTHING	$1.11			
		III - Good, Load Related		DO NOTHING	$1.51			
		IV - Poor		THICK AC OVERLAY(2.5 INCHES)	$1.92			
		V - Very Poor		THIN AC OVERLAY(1.5 INCHES)	$7.47			

Functional Class and Surface combination not used

Decision Tree

Printed: 01/04/2012

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Collector	ST	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	DO NOTHING	$0.00		99	
			Restoration Treatment	DO NOTHING	$0.00			100
		II - Good, Non-Load Related		SINGLE CHIP SEAL	$1.11			
		III - Good, Load Related		SINGLE CHIP SEAL	$1.51			
		IV - Poor		SINGLE CHIP SEAL	$1.92			
		V - Very Poor		THICK AC OVERLAY(2.5 INCHES)	$7.47			

Functional Class and Surface combination not used

Decision Tree

Printed: 01/04/2012

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Residential/Local	AC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$1.30		8	
			Restoration Treatment	2" AC OVERLAY W/ DIGOUTS	$16.90			2
		II - Good, Non-Load Related		2" AC OVERLAY W/ DIGOUTS	$19.40			
		III - Good, Load Related		2" AC OVERLAY W/ DIGOUTS	$19.40			
		IV - Poor		2" AC OVERLAY W/ DIGOUTS	$22.30			
		V - Very Poor		RECONSTRUCT SURFACE (4" AC)	$31.00			
	AC/AC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$1.30		8	
			Restoration Treatment	2" AC OVERLAY W/ DIGOUTS	$16.90			2
		II - Good, Non-Load Related		2" AC OVERLAY W/ DIGOUTS	$19.40			
		III - Good, Load Related		2" AC OVERLAY W/ DIGOUTS	$19.40			
		IV - Poor		2" AC OVERLAY W/ DIGOUTS	$22.30			
		V - Very Poor		RECONSTRUCT SURFACE (4" AC)	$31.00			
	AC/PCC	I - Very Good	Crack Treatment	SEAL CRACKS	$0.60	4		
			Surface Treatment	SINGLE CHIP SEAL	$0.74		8	
			Restoration Treatment	MILL AND THIN OVERLAY	$5.04			3
		II - Good, Non-Load Related		DOUBLE CHIP SEAL	$1.52			
		III - Good, Load Related		HEATER SCARIFY & OVERLAY	$5.95			
		IV - Poor		HEATER SCARIFY & OVERLAY	$6.14			
		V - Very Poor		RECONSTRUCT STRUCTURE (AC)	$8.25			
	PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	4		
			Surface Treatment	DO NOTHING	$0.00		99	
			Restoration Treatment	DO NOTHING	$0.00			100
		II - Good, Non-Load Related		DO NOTHING	$1.11			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		THICK AC OVERLAY(2.5 INCHES)	$1.92			
		V - Very Poor		THICK AC OVERLAY(2.5 INCHES)	$7.27			

Functional Class and Surface combination not used

Decision Tree

Printed: 01/04/2012

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Residential/Local	ST	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	DO NOTHING	$0.00		99	
			Restoration Treatment	DO NOTHING	$0.00			100
		II - Good, Non-Load Related		SINGLE CHIP SEAL	$1.11			
		III - Good, Load Related		SINGLE CHIP SEAL	$1.51			
		IV - Poor		SINGLE CHIP SEAL	$1.92			
		V - Very Poor		THICK AC OVERLAY(2.5 INCHES)	$7.27			

Functional Class and Surface combination not used

Decision Tree

Printed: 01/04/2012

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Other	AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.60	4		
			Surface Treatment	SINGLE CHIP SEAL	$1.74		8	
			Restoration Treatment	MILL AND THIN OVERLAY	$5.04			3
		II - Good, Non-Load Related		SINGLE CHIP SEAL	$1.11			
		III - Good, Load Related		THIN AC OVERLAY(1.5 INCHES)	$3.99			
		IV - Poor		THICK AC OVERLAY(2.5 INCHES)	$5.97			
		V - Very Poor		RECONSTRUCT STRUCTURE (AC)	$8.75			
	AC/AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.60	4		
			Surface Treatment	SINGLE CHIP SEAL	$1.74		8	
			Restoration Treatment	MILL AND THIN OVERLAY	$5.04			3
		II - Good, Non-Load Related		DOUBLE CHIP SEAL	$1.52			
		III - Good, Load Related		HEATER SCARIFY & OVERLAY	$5.95			
		IV - Poor		HEATER SCARIFY & OVERLAY	$6.14			
		V - Very Poor		RECONSTRUCT STRUCTURE (AC)	$8.75			
	AC/PCC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.60	4		
			Surface Treatment	SINGLE CHIP SEAL	$1.74		8	
			Restoration Treatment	MILL AND THIN OVERLAY	$5.04			3
		II - Good, Non-Load Related		DOUBLE CHIP SEAL	$1.52			
		III - Good, Load Related		HEATER SCARIFY & OVERLAY	$5.95			
		IV - Poor		HEATER SCARIFY & OVERLAY	$6.14			
		V - Very Poor		RECONSTRUCT STRUCTURE (AC)	$8.75			
	PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	DO NOTHING	$0.00		99	
			Restoration Treatment	DO NOTHING	$0.00			100
		II - Good, Non-Load Related		DO NOTHING	$1.11			
		III - Good, Load Related		DO NOTHING	$1.51			
		IV - Poor		THICK AC OVERLAY(2.5 INCHES)	$1.92			
		V - Very Poor		THICK AC OVERLAY(2.5 INCHES)	$7.27			

Functional Class and Surface combination not used

Decision Tree

Printed: 01/04/2012

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Other	ST	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	DO NOTHING	$0.00		99	
			Restoration Treatment	DO NOTHING	$0.00			100
		II - Good, Non-Load Related		SINGLE CHIP SEAL	$1.11			
		III - Good, Load Related		SINGLE CHIP SEAL	$1.51			
		IV - Poor		SINGLE CHIP SEAL	$1.92			
		V - Very Poor		THICK AC OVERLAY(2.5 INCHES)	$7.27			

Functional Class and Surface combination not used

Appendix D: Candidate Streets for M&R

Scenario 1. Maintain Current PCI at 75 ($52K per year)

Scenarios - Sections Selected for Treatment

Interest: 5.00% Inflation: 5.00% Printed: 01/05/2012

Scenario: Trinidad - Maintain PCI at 75

Year	Budget	PM Amt	Year	Budget	PM Amt	Year	Budget	PM Amt
2012	$52,000	15%	2013	$52,000	15%	2014	$52,000	3%
2015	$52,000	0%	2016	$52,000	0%	2017	$52,000	0%
2018	$52,000	0%	2019	$52,000	4%	2020	$52,000	15%
2021	$52,000	15%						

Road Name	Begin Location	End Location	Street ID	Section ID	FC	Surface	PCI	Cost	Rating	Treatment
Year: 2012										
HIGHWAY 101 UNDER PASS	HIGHWAY 101 SB OFF RAMP	HIGHWAY 101 NB OFF RAMP	T-H101UP	010	R	AC	100	$19,585	15,174	2" AC OVERLAY W/ DIGOUTS
PATRICKS POINT DRIVE	MAIN ST	N CITY LIMIT	T-PAPODR	010	R	AC	100	$22,583	14,612	2" AC OVERLAY W/ DIGOUTS
					Treatment Total			$42,168		
HIMALAYA DRIVE	BERRY RD	E END	T-HIMADR	010	R	AC	84	$1,572	63,697	SLURRY SEAL
TRINITY STREET	EDWARDS ST	MAIN ST	T-TRINST	010	R	AC	82	$4,505	65,409	SLURRY SEAL
UNDERWOOD DRIVE	N END	HECTOR ST	T-UNWDDR	010	R	AC	83	$1,677	64,909	SLURRY SEAL
WESTHAVEN DRIVE	HIGHWAY 101 NB OFF RAMP	E CITY LIMIT	T-WESTDR	010	RMiA	AC	86	$1,320	88,747	SLURRY SEAL
					Treatment Total			$9,074		
					Year 2012 Total			$51,242		
Year: 2013										
GALINDO STREET	VAN WYCKE ST	EDWARDS ST	T-GALIST	010	R	AC	100	$14,391	11,555	2" AC OVERLAY W/ DIGOUTS
					Treatment Total			$14,391		
AZALEA WAY	PACIFIC CT	EDWARDS ST	T-AZAWAY	010	R	AC	100	$4,854	10,447	RECONSTRUCT SURFACE (4" AC)
					Treatment Total			$4,854		
BERRY ROAD	TRINIDAD FRONTAGE RD	NE END	T-BERRRD	010	R	AC	84	$2,633	61,032	SLURRY SEAL
EAST STREET	OCEAN AVE	VIEW AVE	T-EASTST	010	R	AC	86	$1,125	58,062	SLURRY SEAL

Road Name	Begin Location	End Location	Street ID	Section ID	FC	Surface	PCI	Cost	Rating	Treatment
EDWARDS STREET	SW END	PIER PARKING LOT	T-EDWAST	010	R	AC	92	$3,190	39,420	SLURRY SEAL
EDWARDS STREET	HECTOR ST	TRINITY ST	T-EDWAST	030	R	AC	92	$1,649	39,420	SLURRY SEAL
EWING STREET	EDWARDS ST	N END	T-EWINST	010	R	AC	92	$1,308	39,420	SLURRY SEAL
HECTOR STREET	EDWARDS ST	UNDERWOOD ST	T-HECTST	010	R	AC	88	$978	55,012	SLURRY SEAL
MAIN STREET	TRINITY ST	HIGHWAY 101 SB OFF RAMP	T-MAINST	010	R	AC	84	$5,896	61,002	SLURRY SEAL
OCEAN AVENUE	EDWARDS ST	MAIN ST	T-OCEAVE	010	R	AC	84	$2,928	61,002	SLURRY SEAL
PARKER STREET	HECTOR ST	TRINITY ST	T-PARKST	010	R	AC	86	$1,183	58,062	SLURRY SEAL
SCENIC DRIVE	MAIN ST	LANFORD RD	T-SCENDR	010	R	AC	92	$5,556	39,420	SLURRY SEAL
TRINIDAD FRONTAGE ROAD	WESTHAVEN DR	BERRY RD	T-TRFRRD	010	R	AC	82	$1,872	62,072	SLURRY SEAL
VAN WYCKE STREET	EDWARDS ST	E END	T-VAWYST	010	R	AC	87	$1,299	56,645	SLURRY SEAL
VIEW AVENUE	EAST ST	MAIN ST	T-VIEAVE	010	R	AC	86	$2,652	59,256	SLURRY SEAL
						Treatment Total		$32,269		
						Year 2013 Total		$51,514		
Year: 2014										
STATE PARK ROAD	W END	STAGECOACH RD	T-STPARD	010	R	AC	100	$41,399	11,502	2" AC OVERLAY W/ DIGOUTS
						Treatment Total		$41,399		
STAGECOACH ROAD	MAIN ST	N CITY LIMIT	T-STAGRD	010	R	AC	91	$548	43,133	SLURRY SEAL
						Treatment Total		$548		
						Year 2014 Total		$41,947		
Year: 2015										
WEST STREET	TRINITY ST	OCEAN AVE	T-WESTST	010	R	AC	100	$17,555	12,730	2" AC OVERLAY W/ DIGOUTS
						Treatment Total		$17,555		
						Year 2015 Total		$17,555		
Year: 2016										
LANFORD ROAD	SCENIC DR	N CDS	T-LANFRD	010	R	AC	100	$50,944	12,002	2" AC OVERLAY W/ DIGOUTS
						Treatment Total		$50,944		

Road Name	Begin Location	End Location	Street ID	Section ID	FC	Surface	PCI	Cost	Rating	Treatment
						Year 2016 Total		$50,944		
Year: 2017										
EDWARDS STREET	TRINITY ST	OCEAN AVE	T-EDWAST	040	R	AC	100	$47,232	8,594	RECONSTRUCT SURFACE (4" AC)
						Treatment Total		$47,232		
						Year 2017 Total		$47,232		
Year: 2019										
WESTHAVEN DRIVE	HIGHWAY 101 NB OFF RAMP	E CITY LIMIT	T-WESTDR	010	RMiA	AC	80	$1,857	66,413	SLURRY SEAL
						Treatment Total		$1,857		
						Year 2019 Total		$1,857		
Year: 2020										
HIGHWAY 101 UNDER PASS	HIGHWAY 101 SB OFF RAMP	HIGHWAY 101 NB OFF RAMP	T-H101UP	010	R	AC	88	$1,687	39,646	SLURRY SEAL
HIMALAYA DRIVE	BERRY RD	E END	T-HIMADR	010	R	AC	80	$2,322	44,454	SLURRY SEAL
PATRICKS POINT DRIVE	MAIN ST	N CITY LIMIT	T-PAPODR	010	R	AC	88	$1,946	39,646	SLURRY SEAL
UNDERWOOD DRIVE	N END	HECTOR ST	T-UNWDDR	010	R	AC	79	$2,477	44,525	SLURRY SEAL
						Treatment Total		$8,432		
						Year 2020 Total		$8,432		
Year: 2021										
TRINIDAD FRONTAGE ROAD	WESTHAVEN DR	BERRY RD	T-TRFRRD	010	R	AC	100	$41,258	7,837	2" AC OVERLAY W/ DIGOUTS
						Treatment Total		$41,258		
AZALEA WAY	PACIFIC CT	EDWARDS ST	T-AZAWAY	010	R	AC	87	$301	38,301	SLURRY SEAL
MAIN STREET	TRINITY ST	HIGHWAY 101 SB OFF RAMP	T-MAINST	010	R	AC	80	$8,711	42,389	SLURRY SEAL
						Treatment Total		$9,012		
						Year 2021 Total		$50,270		
						Grand Total		$320,993		

Scenario 2. Unconstrained Needs ($544K over ten years)

Scenarios - Sections Selected for Treatment

Interest: 5.00% Inflation: 5.00% Printed: 01/06/2012

Scenario: Trinidad - Needs (Unconstrained)

Year	Budget	PM Amt	Year	Budget	PM Amt	Year	Budget	PM Amt
2012	$161,215	$40,303	2013	$53,819	$0	2014	$91,421	$0
2015	$17,555	$0	2016	$50,944	$0	2017	$0	$0
2018	$0	$0	2019	$1,857	$1,857	2020	$161,516	$62,199
2021	$5,329	$5,329						

Road Name	Begin Location	End Location	Street ID	Section ID	FC	Surface	PCI	Cost	Rating	Treatment
Year: 2012										
HIGHWAY 101 UNDER PASS	HIGHWAY 101 SB OFF RAMP	HIGHWAY 101 NB OFF RAMP	T-H101UP	010	R	AC	100	$19,585	15,174	2" AC OVERLAY W/ DIGOUTS
PATRICKS POINT DRIVE	MAIN ST	N CITY LIMIT	T-PAPODR	010	R	AC	100	$22,583	14,612	2" AC OVERLAY W/ DIGOUTS
SCENIC DRIVE	LANFORD RD	S CITY LIMIT	T-SCENDR	020	R	AC	100	$74,121	12,930	2" AC OVERLAY W/ DIGOUTS
						Treatment Total		$116,289		
AZALEA WAY	PACIFIC CT	EDWARDS ST	T-AZAWAY	010	R	AC	100	$4,623	10,969	RECONSTRUCT SURFACE (4" AC)
						Treatment Total		$4,623		
BERRY ROAD	TRINIDAD FRONTAGE RD	NE END	T-BERRRD	010	R	AC	85	$2,508	62,725	SLURRY SEAL
EAST STREET	OCEAN AVE	VIEW AVE	T-EASTST	010	R	AC	88	$1,071	58,336	SLURRY SEAL
EDWARDS STREET	SW END	PIER PARKING LOT	T-EDWAST	010	R	AC	93	$3,038	33,839	SLURRY SEAL
EDWARDS STREET	HECTOR ST	TRINITY ST	T-EDWAST	030	R	AC	93	$1,571	33,839	SLURRY SEAL
EWING STREET	EDWARDS ST	N END	T-EWINST	010	R	AC	93	$1,246	33,839	SLURRY SEAL
HECTOR STREET	EDWARDS ST	UNDERWOOD ST	T-HECTST	010	R	AC	89	$931	54,132	SLURRY SEAL
HIMALAYA DRIVE	BERRY RD	E END	T-HIMADR	010	R	AC	84	$1,572	63,697	SLURRY SEAL
MAIN STREET	TRINITY ST	HIGHWAY 101 SB OFF RAMP	T-MAINST	010	R	AC	85	$5,616	62,683	SLURRY SEAL
OCEAN AVENUE	EDWARDS ST	MAIN ST	T-OCEAVE	010	R	AC	85	$2,788	62,683	SLURRY SEAL
PARKER STREET	HECTOR ST	TRINITY ST	T-PARKST	010	R	AC	88	$1,127	58,336	SLURRY SEAL
SCENIC DRIVE	MAIN ST	LANFORD RD	T-SCENDR	010	R	AC	93	$5,291	33,839	SLURRY SEAL
STAGECOACH ROAD	MAIN ST	N CITY LIMIT	T-STAGRD	010	R	AC	93	$497	33,839	SLURRY SEAL

** - Treatment from Project Selection

Scenarios Criteria: Area ID = T - Trinidad

Road Name	Begin Location	End Location	Street ID	Section ID	FC	Surface	PCI	Cost	Rating	Treatment
TRINIDAD FRONTAGE ROAD	WESTHAVEN DR	BERRY RD	T-TRFRRD	010	R	AC	83	$1,783	64,393	SLURRY SEAL
TRINITY STREET	EDWARDS ST	MAIN ST	T-TRINST	010	R	AC	82	$4,505	65,409	SLURRY SEAL
UNDERWOOD DRIVE	N END	HECTOR ST	T-UNWDDR	010	R	AC	83	$1,677	64,909	SLURRY SEAL
VAN WYCKE STREET	EDWARDS ST	E END	T-VAWYST	010	R	AC	88	$1,237	56,454	SLURRY SEAL
VIEW AVENUE	EAST ST	MAIN ST	T-VIEAVE	010	R	AC	87	$2,525	60,107	SLURRY SEAL
WESTHAVEN DRIVE	HIGHWAY 101 NB OFF RAMP	E CITY LIMIT	T-WESTDR	010	RMiA	AC	86	$1,320	88,747	SLURRY SEAL
							Treatment Total	$40,303		
							Year 2012 Total	$161,215		

Year: 2013

GALINDO STREET	VAN WYCKE ST	EDWARDS ST	T-GALIST	010	R	AC	100	$14,391	11,555	2" AC OVERLAY W/ DIGOUTS
STATE PARK ROAD	W END	STAGECOACH RD	T-STPARD	010	R	AC	100	$39,428	11,555	2" AC OVERLAY W/ DIGOUTS
							Treatment Total	$53,819		
							Year 2013 Total	$53,819		

Year: 2014

EDWARDS STREET	GALINDO ST	HECTOR ST	T-EDWAST	020	R	AC	100	$50,620	11,189	2" AC OVERLAY W/ DIGOUTS
							Treatment Total	$50,620		
EDWARDS STREET	TRINITY ST	OCEAN AVE	T-EDWAST	040	R	AC	100	$40,801	9,949	RECONSTRUCT SURFACE (4" AC)
							Treatment Total	$40,801		
							Year 2014 Total	$91,421		

Year: 2015

WEST STREET	TRINITY ST	OCEAN AVE	T-WESTST	010	R	AC	100	$17,555	12,730	2" AC OVERLAY W/ DIGOUTS
							Treatment Total	$17,555		
							Year 2015 Total	$17,555		

Year: 2016

Road Name	Begin Location	End Location	Street ID	Section ID	FC	Surface	PCI	Cost	Rating	Treatment
LANFORD ROAD	SCENIC DR	N CDS	T-LANFRD	010	R	AC	100	$50,944	12,002	2" AC OVERLAY W/ DIGOUTS
						Treatment Total		$50,944		
						Year 2016 Total		$50,944		
Year: 2019										
WESTHAVEN DRIVE	HIGHWAY 101 NB OFF RAMP	E CITY LIMIT	T-WESTDR	010	RMiA	AC	80	$1,857	66,413	SLURRY SEAL
						Treatment Total		$1,857		
						Year 2019 Total		$1,857		
Year: 2020										
TRINITY STREET	EDWARDS ST	MAIN ST	T-TRINST	010	R	AC	100	$99,317	8,322	2" AC OVERLAY W/ DIGOUTS
						Treatment Total		$99,317		
AZALEA WAY	PACIFIC CT	EDWARDS ST	T-AZAWAY	010	R	AC	87	$287	40,216	SLURRY SEAL
BERRY ROAD	TRINIDAD FRONTAGE RD	NE END	T-BERRRD	010	R	AC	81	$3,705	44,323	SLURRY SEAL
EAST STREET	OCEAN AVE	VIEW AVE	T-EASTST	010	R	AC	83	$1,583	43,742	SLURRY SEAL
EDWARDS STREET	SW END	PIER PARKING LOT	T-EDWAST	010	R	AC	87	$4,489	41,062	SLURRY SEAL
EDWARDS STREET	HECTOR ST	TRINITY ST	T-EDWAST	030	R	AC	87	$2,321	41,062	SLURRY SEAL
EWING STREET	EDWARDS ST	N END	T-EWINST	010	R	AC	87	$1,841	41,062	SLURRY SEAL
HIGHWAY 101 UNDER PASS	HIGHWAY 101 SB OFF RAMP	HIGHWAY 101 NB OFF RAMP	T-H101UP	010	R	AC	88	$1,687	39,646	SLURRY SEAL
HECTOR STREET	EDWARDS ST	UNDERWOOD ST	T-HECTST	010	R	AC	84	$1,376	43,125	SLURRY SEAL
HIMALAYA DRIVE	BERRY RD	E END	T-HIMADR	010	R	AC	80	$2,322	44,454	SLURRY SEAL
MAIN STREET	TRINITY ST	HIGHWAY 101 SB OFF RAMP	T-MAINST	010	R	AC	81	$8,297	44,323	SLURRY SEAL
OCEAN AVENUE	EDWARDS ST	MAIN ST	T-OCEAVE	010	R	AC	81	$4,119	44,323	SLURRY SEAL
PATRICKS POINT DRIVE	MAIN ST	N CITY LIMIT	T-PAPODR	010	R	AC	88	$1,946	39,646	SLURRY SEAL
PARKER STREET	HECTOR ST	TRINITY ST	T-PARKST	010	R	AC	83	$1,665	43,742	SLURRY SEAL
SCENIC DRIVE	MAIN ST	LANFORD RD	T-SCENDR	010	R	AC	87	$7,818	41,062	SLURRY SEAL
SCENIC DRIVE	LANFORD RD	S CITY LIMIT	T-SCENDR	020	R	AC	88	$7,339	39,646	SLURRY SEAL
STAGECOACH ROAD	MAIN ST	N CITY LIMIT	T-STAGRD	010	R	AC	87	$735	41,062	SLURRY SEAL
TRINIDAD FRONTAGE ROAD	WESTHAVEN DR	BERRY RD	T-TRFRRD	010	R	AC	80	$2,634	44,475	SLURRY SEAL

Road Name	Begin Location	End Location	Street ID	Section ID	FC	Surface	PCI	Cost	Rating	Treatment
UNDERWOOD DRIVE	N END	HECTOR ST	T-UNWDDR	010	R	AC	79	$2,477	44,525	SLURRY SEAL
VAN WYCKE STREET	EDWARDS ST	E END	T-VAWYST	010	R	AC	84	$1,827	43,397	SLURRY SEAL
VIEW AVENUE	EAST ST	MAIN ST	T-VIEAVE	010	R	AC	83	$3,731	43,936	SLURRY SEAL
							Treatment Total	$62,199		
							Year 2020 Total	$161,516		

Year: 2021

GALINDO STREET	VAN WYCKE ST	EDWARDS ST	T-GALIST	010	R	AC	88	$1,425	37,758	SLURRY SEAL
STATE PARK ROAD	W END	STAGECOACH RD	T-STPARD	010	R	AC	88	$3,904	37,758	SLURRY SEAL
							Treatment Total	$5,329		
							Year 2021 Total	$5,329		
							Grand Total	$543,656		