City of

Palm Desert

PUBLIC WORKS

CITY WIDE PARKING LOT CONDITION ASSESSMENT FEBRUARY 2024

Civil Engineering Design
Construction Management
Infrastructure Management
GIS Mapping & Data Systems
Inspection

OMNIS INCORPORATED

OMNIS INCORPORATED
981 W. ARROW HWY #248
SAN DIMAS, CA 91773
909-631-8335 Office
www.omnis-inc.com

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EXECUTIVE SUMMARY

The Pavement Management Program (PMP) for parking lots with the City of Palm Desert provides a current inventory, with condition and preservation requirement, for the parking lots, and a forecasting of the budget needs.

While the following recommendations have been generated by the Pavement Management Program, they are for planning purposes only and are not intended to replace sound engineering judgement. Final project recommendations should be weighed against the actual approach the City wishes to utilize in scheduling the workloads for contracting purposes. In addition, an engineering review of the pavement condition may indicate that a particular pavement section needs attention earlier than the other roads in its localized area.

- **Replacement value & quantity of pavement**
  The parking lots within the City of Palm Desert have 2,121,973 square feet of paved surfaces. There are a total of 4,504 parking spaces with an additional 200 handicapped spaces. The estimated replacement value of the pavement of the roadway network for all paved parking lots is $14.3 million.

- **Condition of City's parking lots**
  The overall condition of the City of Palm Desert's road network is Very Good, with an average "Pavement Condition Index" of 73.2, with 100 being a brand new street and 0 being a badly deteriorated street with virtually no remaining life.

- **Recommended preservation program and costs.**
  A strategy was developed to reduce the backlog of street preservation work over the next 5 years and increase the overall condition of the road network. This strategy involves using both slurry seal and pavement resurfacing as preservation components.

  Preventative maintenance on parking lots with better than average PCI ratings must be considered in combination with the more extensive rehabilitation of failing areas to realize the maximum net benefit and reduce the long term costs. The strategies herein were developed to provide alternatives for halting the deterioration of the existing pavement, reducing the backlog of maintenance work over the next 5 years and improving the overall condition of the parking lot network. These strategies generally involve the utilization of crack sealing, patching, slurry sealing, and major work typically consisting of pavement overlays and reconstruction. Future parking lot maintenance plans for the City of Palm Desert should be based on the general maintenance strategies developed from this pavement system analysis in combination with the other major contributing factors as discussed previously in this executive summary.

SECTION I
INTRODUCTION

NEED FOR PAVEMENT MANAGEMENT SYSTEM

A Citywide Pavement Management Program will assist City personnel by providing current technical data to maintain a desirable level of pavement performance, while optimizing the expenditure of limited fiscal resources.

Specifically, this parking lot program provides administrators and maintenance personnel with:

- A current inventory of all public parking lots including number of spaces
- The current pavement condition for all public parking lots
- A project listing of all pavement needing maintenance, rehabilitation, or replacement
- A forecast of budget needs for maintenance, rehabilitation, or replacement of deficient sections of pavement for a 5 year Capital Improvement Program

THE PAVEMENT NETWORK

The entire parking lot network within the City of Palm Desert is comprised of 2.1 million square feet of paved surface. The entire parking lot pavement network represents a current replacement valuation of $14.3 million.

CURRENT CONDITIONS

As part of the development of the Parking Lot Pavement Management System for the City of Palm Desert, a visual survey of the pavement network was conducted to assess the existing surface condition of each individual pavement segment. The federal guidelines specified by the Army Corps of Engineers in their *Pavement Distress Identification Guide for Asphalt-Surfaced Roads and Parking Lots*, dated June 1997, were used as the basis of the visual survey. Upon completion of this survey, a Pavement Condition Index (PCI) was calculated for each segment to reflect overall pavement condition. The PCI system is a rating mechanism used to describe the condition of the City's pavement and has been adopted as the nation's standard rating system by AASHTO and ASTM. Ranging between "0" and "100," a PCI of "0" would correspond to a badly deteriorated pavement with virtually no remaining life, while a PCI of "100" would correspond to a pavement with proper engineering design and construction at the beginning of its life cycle.

The table below relates PCI ranges to general pavement condition definitions.

PCI RANGE	CONDITION
86 –100	Excellent
71 - 85	Very Good
56 - 70	Good
41 - 55	Fair
26 - 40	Poor
11 - 25	Very Poor
0 - 10	Failed

A. PCI Ranges*

* These are the ranges recommended by the U. S. Army Corps of Engineers.

The overall condition of the City of Palm Desert's road network based on current conditions is "Very Good" with an average PCI of 73.2.

ANNUAL BUDGET PROJECTIONS

Based on the results of the condition survey and input from the City, pavement preservation/rehabilitation strategies were developed. A standard agreement at the outset was to identify the City's preservation and maintenance work program for the next 5 years, while reducing the preservation and maintenance backlog and increasing the overall condition of the network.

A listing of the preservation and maintenance activities utilized in the strategy development is presented in Section 2. Each activity is representative of the types of work that have been programmed as part of the long term preservation and maintenance requirements of the City's parking lot network.

The budgeting process was approached with the following in mind: generate a work program for the next 5 years based upon actual parking lot pavement conditions in order to keep deferred maintenance constant and maintain the current high level overall condition.

The budget analysis at the Draft Report stage is to assist the City Staff in the creation of a suitable plan that will meet the City's current standards and goals. After discussions and meetings, Omnis Inc. will have analyzed multiple scenarios for the Final Report which should reflect the goals of City Staff.

- UNLIMITED BUDGET– This scenario will show the work recommended for all maintenance types for all parking lots requiring maintenance in 2024.
- $500,000 ANNUAL (CURRENT) BUDGET– This scenario will show the work recommended for all maintenance types with a $500,000 annual budget. The budget was run for a five year period with a 5% annual inflationary increase to the unit costs.

This plan is to develop an understanding of how the system will assign parking lot locations with budget dollars. The purpose is to create an accurate budget scenario for the City of Palm Desert. The longer the system is maintained greater accuracy levels will be achieved.

RECOMMENDATIONS

The actual workload requirements identified indicate that the street network is currently in good condition. To maintain this condition, it is critical that the preservation activities be funded at the levels identified in the recommended work program to maintain a high network PCI value.

In order to meet these requirements, certain projects have been recommended within the context of this program. The funding requirements just presented are generated in the form of individual projects, as outlined in the Projected Work Reports (Section V).

While the project listings outlined in Section V are the recommendations as generated by the PMS, they are for planning purposes only and are not intended to replace engineering judgement. Before construction has actually started on the pavement work, a field verification should be conducted to ascertain whether conditions still warrant the recommended treatment or whether they have worsened. Final project recommendations should be weighed against the actual approach the City wishes to utilize in scheduling the workloads for contracting purposes. Pavement condition may indicate that a particular pavement section needs attention earlier than the rest of the roads in its localized area.

Because pavement deterioration is a never-ending phenomenon, OMNIS Inc. recommends that all Arterial routes be re-inspected over the course of the next two years. In addition, OMNIS recommends all Local roads be re-inspected over the course of the next three years (approximately 33% of the streets each year). This recommended inspection cycle will fulfill the requirements for the TEA-21 funding program and GASB 34. The costs for the re-inspection should be included in the annual pavement management budget to assure that the PMS has updated, accurate information. The Parking Lot program can be combined with any existing Pavement Management Program. Unit costs will be better in conjunction with the pavement management scheduling.

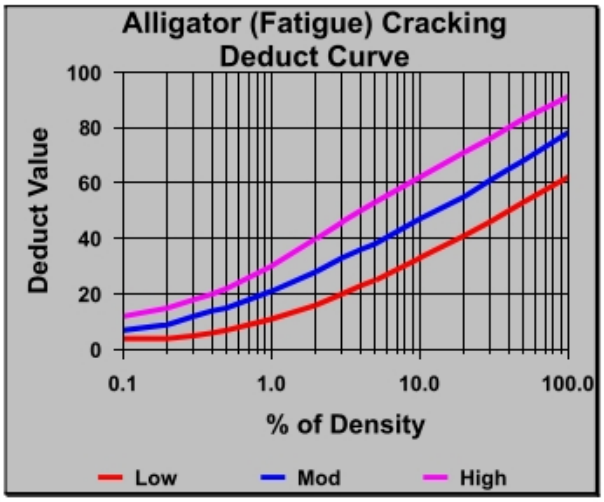
SECTION II
METHODOLOGY

The following section provides a description of the methodology and rationale utilized in determining the recommended actions identified in this report.

Field Survey

An inventory of parking lot data for each public roadway within the City of Palm Desert was completed. Data, including distress types and quantities, length and width for an adjusted total area, drainage, spaces, etc. was collected on all public parking lots. Using a combination of City GIS maps and field survey forms to collect field information, a field crew visually surveyed each parking lot. Data was categorized by parking lot surface type and "maintenance" area. Maintenance limits were typically identified as a local in its entirety unless different pavement types were discovered. Different pavement types, i.e. asphalt versus Portland concrete cement, was separated into separate program segments for budgeting and planning. All data collected was entered into the APWA MicroPAVER version 5.2 pavement management software.

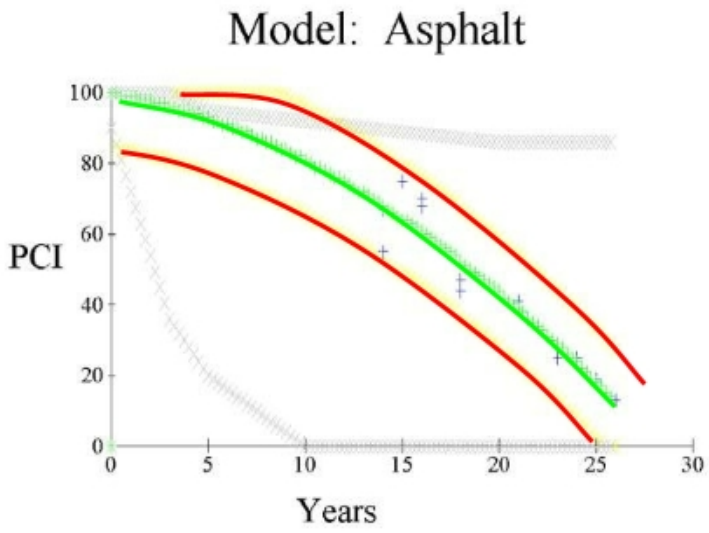
After the data entry procedures were completed, a resultant distress rating was calculated for each segment. The distress rating is calculated using an algorithm developed by the Army Corps of Engineers that is recommended by the American Public Works Association and incorporated within the MicroPAVER software. The algorithm begins by giving each pavement section a score of 100 then deducting point values based on the pavement distress found within the section weighted by the quantity of distress. The Army Corps has assigned deduct values based on severity (low, moderate, or high) and the density of each distress, as shown below in the case of alligator (fatigue) cracking. The following chart is an example of an algorithm for alligator cracking in asphalt pavement.



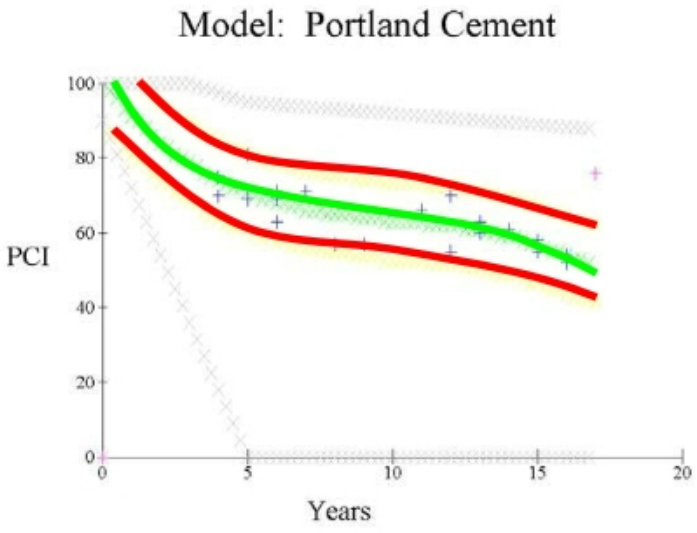
The algorithm weighs the total deducts within a section and calculates a total distress rating between 0 (failed) and 100 (excellent).

The summary of all road condition data and the representative PCI's are located in the Condition Data Report in Section IV.

Once the PCI has been established for a pavement section, the analysis and workload predictions can be commenced. Predictions on future pavement performance are based on a pavement deterioration curve researched and developed by the Army Corps of Engineers. The deterioration curves below shows the expected deterioration rate for typical asphalt (AC). The gray line represents the outer limits of data allowed to be included in creating the curve. Data beyond these limits will be considered anomalies. The yellow lines represent the upper and lower levels of data collected for an area. The green lines represent the deterioration curve for asphalt. Taking the averages of yellow line data creates the green line.



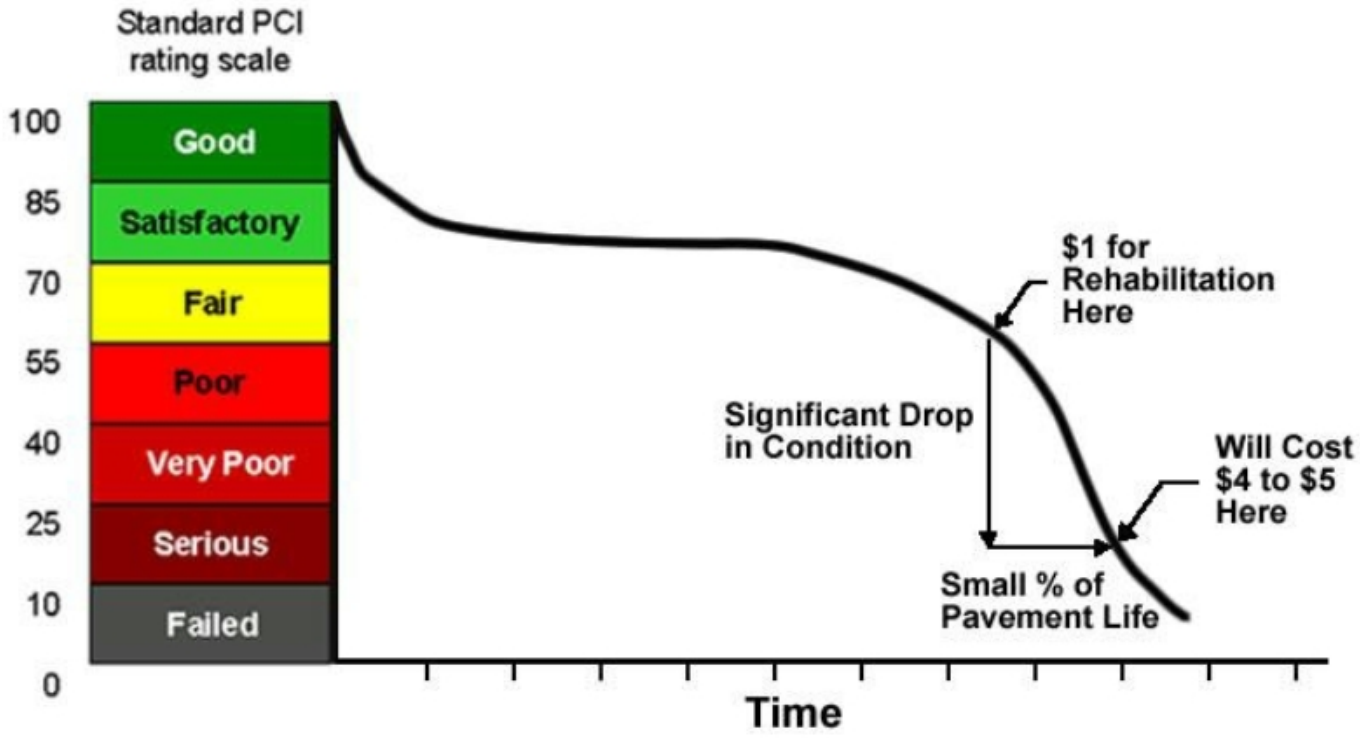
Standard Deterioration Curve for Asphalt Concrete (AC) Pavements



Standard Deterioration Curve for Portland Concrete Cement (PCC) Pavements

As a pavement ages, the system predicts the PCI of the pavement based on the deterioration curves.

The next step in the analysis is to determine at what point simple maintenance has become major rehabilitation. In the following chart it is suggested that after 75% of useful life renovation can take place for about $1.00 a square foot. If we wait 3 more years or 12% of life longer the cost is substantially higher at $4.00 a square foot.



As you can see by the above graphic, by doing preventative maintenance on a pavement earlier in the pavements life, a substantial amount of money can be saved.

MAINTENANCE STRATEGY ASSIGNMENTS

The PCI is used by the system to schedule each pavement segment for maintenance activities. The MicroPAVER program recommends a specific maintenance activity based on the PCI and budget constraints. The MicroPAVER system generates work based on categories of maintenance, such as localized, global and major maintenance. The engineering group has created the following unit costs that should be reviewed and approved by the City of Palm Desert staff and used for budget scenarios.

				Slurry
		Overlay	Reconstruction	Seal
Construction	$/SF	$2.75	$5.25	$0.75
Design	10.00%	$0.28	$0.53	$0.04
Inspection/Testing/Survey	10.00%	$0.28	$0.53	$0.08
Construction Management	3.50%	$0.10	$0.18	$0.02
City Administration	5.00%	$0.14	$0.26	$0.04
		$3.53	**$6.75**	**$0.92**

MAINTENANCE & REPAIR DECISIONS

Once the activities were chosen and unit costs were defined, budgets and work assignments were generated for each work program on an annual basis. Using the pavement deterioration curves for each type of pavement surface and class of road, both current year and future years work requirements for each pavement segment within the City were determined. The current PCI is reduced annually based on the deterioration curve, maintenance activities increase the PCI value as they are applied to the segment. The overall program is dynamic in that each strategy consists of a cyclic series of actions that simulates pavement's anticipated life cycle.

PAVEMENT MANAGEMENT SYSTEM REPORTS

In addition to the annual budgets, this report contains a comprehensive assemblage of pavement management reports ranging from summary reports to annual maintenance and rehabilitation schedules. Collectively, as well as individually, the reports represent reasonable projections of pavement maintenance needs and performance based on visual condition assessments, unit cost estimates, and pavement deterioration models.

It is important to note that pavement dimensions and surface area, along with the action and repair costs, as presented on the reports, are accurate within tolerable limits. Survey was **not** conducted. This is noteworthy due to the "implied" accuracy of reporting length and width to the nearest foot, surface area to the nearest square foot, and action and repair unit costs and project estimates to the nearest penny and dollar, respectively.

SYSTEM MAINTENANCE

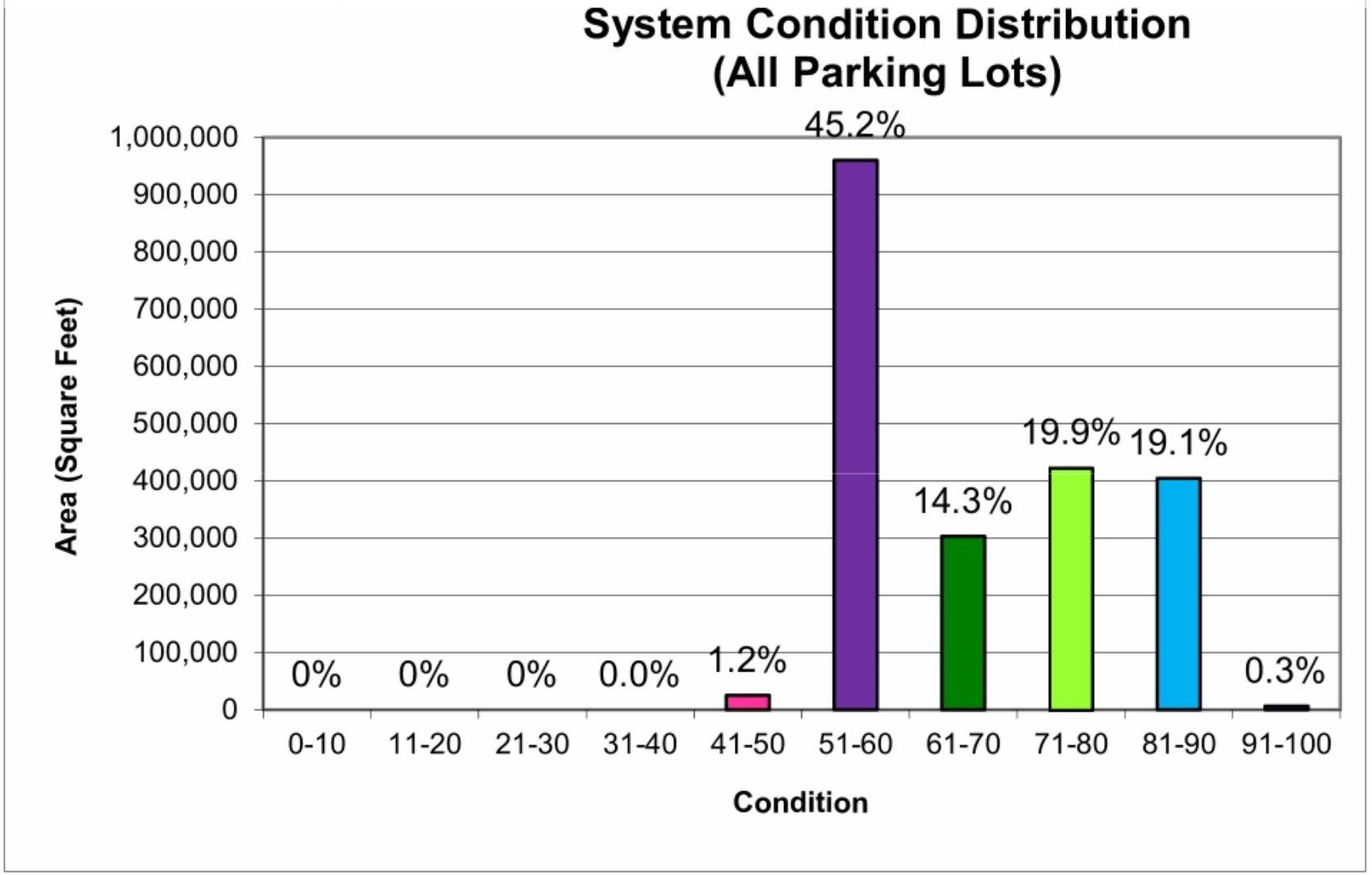
The City personnel need to maintain their commitment to the preventive maintenance system, while working toward reducing the City's present backlog of rehabilitation projects.

In order to ensure that report outputs are accurate and credible, it is essential that the integrity of all data files be maintained. This will require performing all necessary updates when changes are made to scheduling scenarios, unit cost information, historical data, etc. In addition, the entire pavement network will have to be re-inventoried at regular intervals. This will not only allow work to be scheduled based on the most current condition data available, but will provide City personnel with a means to monitor actual rates of pavement deterioration so appropriate modifications can be made to the system curves.

SECTION III
CONDITION DISTRIBUTION REPORT

This report graphically depicts the distribution of the pavement condition throughout the street network by area. The condition ranges from "Failed" to "Excellent", with an "Excellent" condition corresponding to a pavement at the beginning of its life cycle, and a "Failed" condition representing a badly deteriorated pavement with virtually no remaining life. The tables on the following pages show the general description for each pavement condition:

Condition	PCI Range	Description
Excellent	86 - 100	No significant distress.
Very Good	71 - 85	Little distress, with the exception of utility patches in good condition, or slight hairline cracks; may be slightly weathered.
Good	56 - 70	Slight to moderately weathered, slight distress, possibly patching.
Fair	41 - 55	Severely weathered or slight to moderate levels of distress generally limited to patches and non-load-related cracking.
Poor	26 - 40	Moderate to severe distresses including load-related types, such as alligator cracking.
Very Poor	11 - 25	Severely distressed or large quantities of distortion or alligator cracking.
Failed	0 - 10	Failure of the pavement, distress has surpassed tolerable rehabilitation limits.


System Condition Distribution
(All Parking Lots)
Area (Square Feet)
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
0%
0%
0%
0.0%
1.2%
45.2%
14.3%
19.9%
19.1%
0.3%
0-10
11-20
21-30
31-40
41-50
51-60
61-70
71-80
81-90
91-100
Condition

SECTION IV
PAVEMENT CONDITION INDEX (PCI) REPORT

OMNIS Inc submits a PCI Reports alphabetically that is listed by parking lot name provided by the City's GIS system. The report provides the City with a listing of pertinent inventory and pavement condition data for each pavement area within the City's parking lot network. The Pavement Condition Index (PCI) Report notes the names, location, surface type, dimension, total area and PCI as of the last inspection for each parking lot section.

Detailed descriptions of the information appearing on this report are presented below:

Branch Name - The name of each parking lot section appears in this column. Generally, the pavement section name is taken directly the GIS system provided by the City.

Section Number – If the parking lots had different pavements or areas with drastic changes to condition, an additional Section was created with the same parking lot name.

From – Omnis used the From attribute for the Street Name that the parking lot is located.

To – Omnis used the To attribute to store the address. If no visible address was available at the site we used Google Earth to determine the address.

Surface - A code was assigned to each pavement section to describe surface type.

CODE	DESCRIPTION
AC	Asphalt Concrete
PCC	Portland Concrete Cement

Rank - The rank of each pavement section appears in this column.

CODE	DESCRIPTION
O	Parking Lot

If the City maintains a pavement management program it is important to keep the code designation separate from Arterials, Collectors, Residentials, and Alleyways.

Length – The general length of the pavement section.

Width – The general width of the pavement section.

Area – The area of the pavement section was adjusted to coincide with the GIS data. An overall area was calculated using Autocad. Omnis did not find any large discrepancies in pavement areas.

PCI - Pavement Condition Indexes were calculated for pavement sections based on severity and extent of distress manifestations observed within the pavement section. Ranging between 0 and 100, a PCI of "100" corresponds to a pavement at the beginning of its life cycle, while a PCI of "0" corresponds to a badly deteriorated pavement which is at or near the end of its life cycle.

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Citywide Parking Lot Condition Assessment
Final Report February 2024

Section IV

Parkling Lot PCI Report

Name	ID	From	To	Spaces	Spaces	Length	Width	True Area	# of Slabs	Type	PCI
AQUATIC CENTER	1	MAGNESIA FALLS	72140 MAGNESIA FALLS	10	108	465	265	66300		AC	67
CAHUILLA HILLS PARK	1	EDGEHILL DR	45-925 EDGEHILL DR	0	14	135	18	2430	51	PCC	100
CIVIC CENTER	1	SAN PABLO AVE	43942 SAN PABLO AVE	23	675	1520	250	368000		AC	56
CIVIC CENTER	2	SAN PABLO AVE	43942 SAN PABLO AVE	0	40	165	66	10890	27	PCC	82
CORP YARD	1	42ND AVE	74733 42ND AVE	1	93	575	240	138000		AC	70
CORP YARD	2	42ND AVE	74733 42ND AVE	2	0	130	125	16250	116	PCC	87
CORP YARD EAST	1	42ND AVE	74700 VELIE WAY	0	0	235	96	22175		AC	52
DESERT WILLOW ACADEMY	1	PORTOLA AVENUE	38500 PORTOLA AVE	4	110	245	225	48125		AC	57
DESERT WILLOW CLUBHOUSE	1	DESERT WILLOW DR	@ ROUNDABOUT	9	189	635	125	79375		AC	77
DESERT WILLOW INTRAWEST TEMP LOT	1	DESERT WILLOW DR	NEAR WILLOW RIDGE	0	47	230	120	25350		AC	48
ENTRADA DEL PASEO	1	EL PASEO	72261 EL PASEO	11	219	900	140	104000		AC	72
FIRE STATION #33	1	TOWN CENTER WAY	44400 TOWN CENTER WY	1	15	175	104	17700	44	PCC	78
FIRE STATION #67	1	MESA VIEW DR	73200 MESA VIEW DR	1	12	130	72	9360		AC	86
FIRESTATION #71	1	COUNTRY CLUB	73995 COUNTRY CLUB DR	2	13	225	70	13350	33	PCC	81
FREEDOM PARK	1	COUNTRY CLUB DR	77400 COUNTRY CLUB DR	6	187	750	125	93900		AC	71
HISTORICAL SOCIETY FIRE STATION	1	EL PASEO	72873 EL PASEO	1	11	150	50	8600		AC	65
HOVLEY SOCCER PARK	1	HOVLEY LANE E	74735 HOVLEY LANE E	6	240	820	130	91600		AC	80
HOVLEY SOCCER PARK OVERFLOW	1	42ND AVE	74750 42ND AVE	2	122	375	125	43075		AC	70
IRONWOOD PARK	1	CHIA DRIVE	47800 CHIA DR	2	34	285	66	16810		AC	82
JEAN BENSON CHILDCARE	1	ORANGE BLOSSOM LN	75433 ORANGE BLOSSOM LN	1	17	145	50	7350		AC	69
JOE MANN PARK	1	CALIFORNIA DR	77810 CALIFORNIA DR	2	35	135	120	16500		AC	70
JOSLYN SENIOR CENTER	1	CATALINA WAY	73750 CATALINA WAY	10	108	720	64	46080		AC	58
MAGNESIA FALLS PARK	1	MAGNESIA FALLS DR	74309 MAGNESIA FALLS DR	3	54	500	65	32500		AC	72
MALL PARKING SEARS	1	PLAZA WAY	72810 HWY 111	19	485	650	350	189500		AC	59
PALMA VILLAGE PARK	1	SAN CARLOS AVE	44550 SAN CARLOS AVE	2	8	110	26	3010	20	PCC	100
PARKVIEW OFFICE COMPLEX	1	FRED WARING	73698 FRED WARING	8	193	525	175	91875		AC	54
PORTOLA COMMUNITY CENTER	1	PORTOLA AVE	45480 PORTOLA AVE	2	24	160	61	9975		AC	83
PRESIDENT PLAZA 3	1	SAGE LANE	45102 SAGE LN	25	500	960	195	173200		AC	60
PRESIDENT PLAZA 3	2	SAGE LANE	45102 SAGE LN	0	49	190	115	21850	146	PCC	87
PRESIDENT PLAZA E	1	SAN LUIS REY	45142 SAN LUIS REY	16	387	905	170	159000		AC	90

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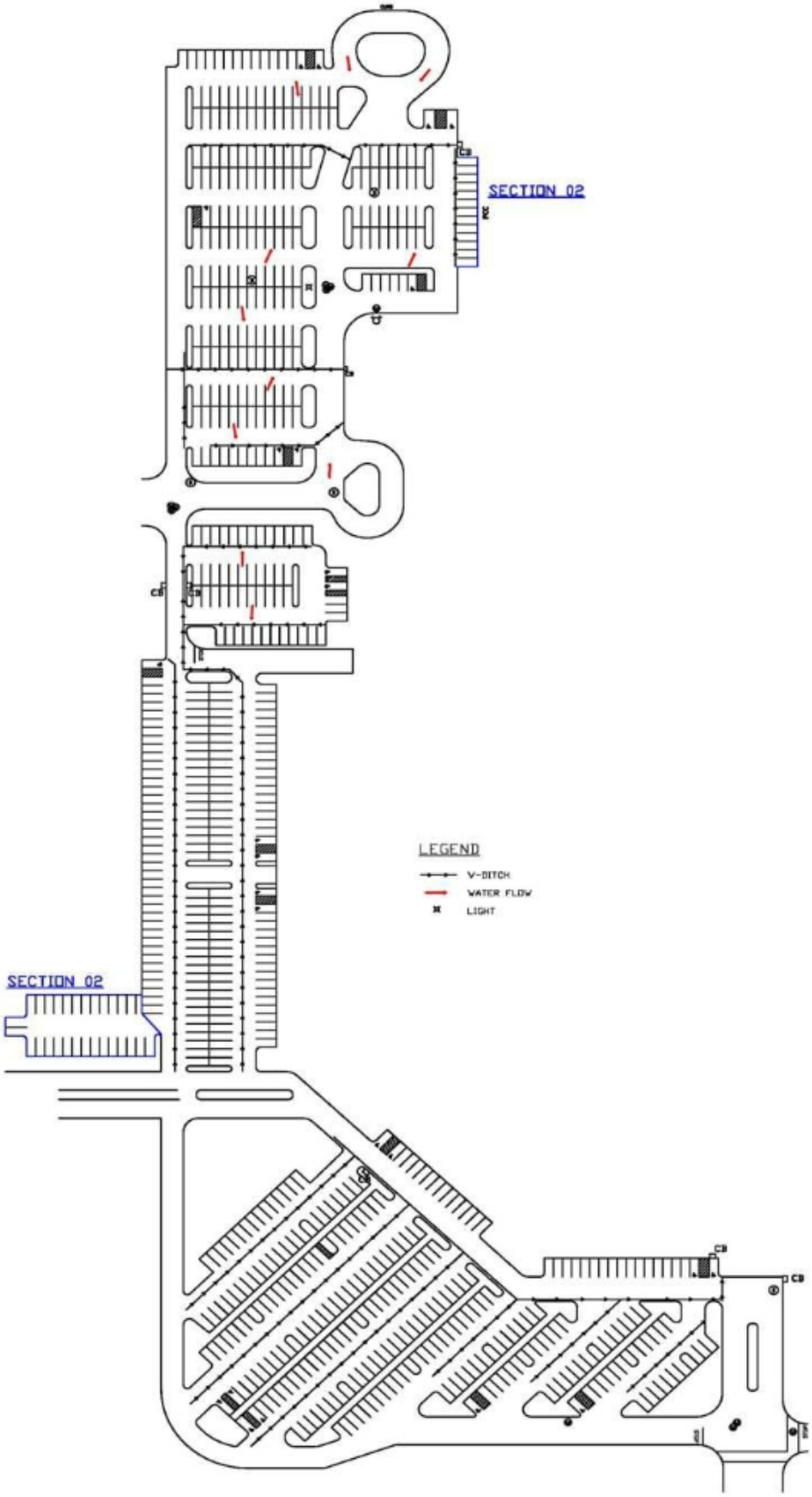
Section IV

Parkling Lot PCI Report

Name	ID	From	To	Spaces	Spaces	Length	Width	True Area	# of Slabs	Type	PCI
PRESIDENT PLAZA E	2	BANK AREA	BANK AREA	2	32	140	120	16800		AC	68
PRESIDENT PLAZA E	3	CONCRETE PAD	CONCRETE PAD	0	0	34	25	850	8	PCC	93
PRESIDENT PLAZA W	1	SAN LUIS REY	45143 SAN LUIS REY	23	386	900	180	143000		AC	89
SHERIFF SUB STATION	1	FRED WARING DR	73648 FRED WARING DR	1	40	150	130	21000		AC	58
SHERIFF SUB STATION	2	FRED WARING DR	73648 FRED WARING DR	0	6	50	44	2200	9	PCC	67
UNIVERSITY DOG PARK	1	UNIVERSITY PARK DR	74802 UNIVERSITY PARK DR	2	11	165	27	4155		AC	69
UNIVERSITY PARK EAST	1	UNIVERSITY PARK DR	74902UNIVERSITY PARK DR	1	9	137	27	3950		AC	71
WASHINGTON CHARTER	1	LANTANA AVE	45654 LANTANA AVE	2	31	375	16	6000		AC	84
				200	4,504			2,124,085			73.2

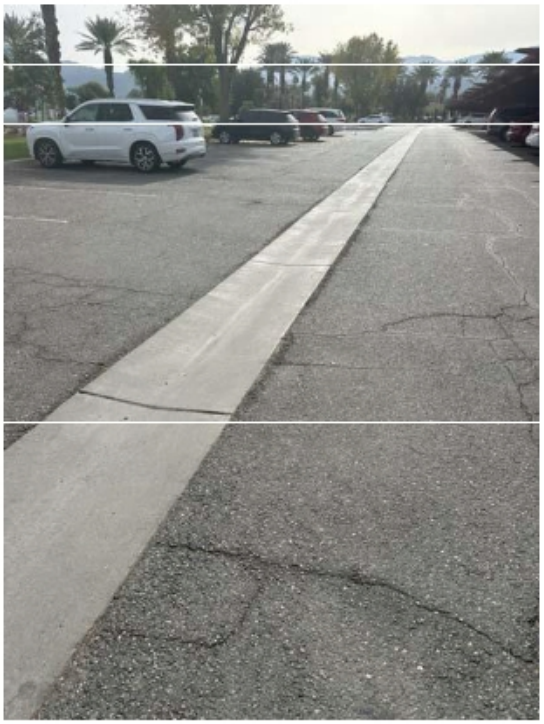
Total Area	**2,124,085**	**SF**
Total Parking Spaces	**4,504**	**Spaces**
Total Handicapped	**200**	**Spaces**
Average PCI	**73.2**	**PCI**

CIVIC CENTER



The Civic Center has two segment ID's due to change of pavement, Section 02 in Blue.

Section 01 is Asphalt of 368,000 SF with 675 spaces and 23 handicapped spaces. It has a PCI rating of 56 due to a majority of the area is Block cracked with both Low and Medium severity. There is localized digouts needed for Alligator Cracking. The Weathering did reach Medium Levels for about 10% of the area.



The area sheet flows to V-ditch areas to a Catch Basin. No drainage issues are found.

Section 02 is the parking area for the Electric Vehicle charging stations. It is made of Portland concrete cement of 10,890 SF. We found 27 slabs, 3 were Divided Slabs and 5 were Linear Cracking. The overall PCI rating for Section 02 is Very Good at 82 with 40 spaces, no handicapped.

PARKVIEW OFFICE COMPLEX

The Parkview Office Complex is 91,875 SF of asphalt with 193 spaces and 8 handicapped spaces. It has a PCI rating of 54.
The distresses found are:
15% Alligator Cracking
10% Medium Block Cracking
60% Block Cracking
Patch Cuts
100% Weathering - Raveling

The drainage flows to V-Ditch that flow to Catch Basins.