FINAL REPORT

UPDATED CITYWIDE
PAVEMENT MANAGEMENT PLAN
OC Go
2022-2029

Submitted to:

City of Huntington Beach, CA
May 13, 2022

May 13, 2022

Mr. Chris Tanio
Department of Public Works
CITY OF HUNTINGTON BEACH
2000 Main Street
Huntington Beach, CA 92648

Subject: **City of Huntington Beach –OCTA Pavement Management Compliance Report 2022**

Dear Chris:

As part of the 2022 Update of the Pavement Management Plan (PMP) for the City of Huntington Beach, *Bucknam Infrastructure Group, Inc.* is pleased to submit the PMP reporting required by the Orange County Transportation Authority (OCTA). This data/report will be submitted to OCTA as part of the City's required biennial PMP prior to June 30, 2022.

The information contained in this report was used to develop the recommended improvement program for the pavement network. The report covers the following categories:

- **Pavement Management Plan Certification**

- **Quality Assurance / Quality Control (QA/QC) Plan**

- **Pavement Management Data Files (electronic Huntington Beach.e70 file format)**

- **Pavement Management Plan that includes the following:**

    - **Average Pavement Conditions For Each Segment in the Network (PCI Report)**
      The Pavement Condition Index report shows the present condition of each street in the pavement network (Master Plan of Arterial Highway (MPAH) and Locals). In addition, the report shows the basic geometry of each street segment.

    - **Seven-year Projected PCI Under Existing Funding Levels**
      This report identifies the projected PCI's based on the local agencies current funding programs. This report details the PCI projects for the entire network, MPAH roadways and Local streets.

    - **Seven-year Plan for Road Maintenance and Rehabilitation (Forecasted Maintenance Report)**
      The Forecasted Maintenance Report projects the street maintenance activities required for the next seven years, broken down to show maintenance levels for all streets. This includes all scheduled projects provided by the City for fiscal years 2022 through 2029.

- **Alternative Funding Levels**

  OCTA has requested two reports indicating the necessary funding to maintain the City's current weighted average PCI as well as the necessary funding to improve the weighted average PCI by one PCI point over the next seven years.

- **Backlog by Fiscal Year (re: unfunded restoration, rehabilitation and reconstruction)**

- **Percentage of total network in each of the five condition categories based on centerline mileage**

- **Local Match Reduction Reporting**

  - ❖ In order to be eligible for Local Match Reduction of 10%, the following must be submitted:
    - o Measurable improvement of paved road conditions during the previous reporting period defined as an overall weighted (by area) average system improvement of one PCI point.
    - o No reduction in the overall weighted (by area) average PCI in the MPAH or local street categories

      - or –
    - o Have road pavement conditions, for the overall network, during the previous reporting period within the highest twenty (20%) of the scale for road pavement conditions in conformance with OCTA Ordinance No. 3, defined as a PCI of 75 or higher, otherwise defined as in "good condition".

These reports will be submitted to the City of Huntington Beach as part of the biennial Pavement Management Plan that is due prior to June 30, 2022. These reports will be packaged in a way that it will be easy for staff to review.

All comments received from the City have been incorporated in the reports that follow. All of the City's issues and needs that were brought to our attention are included in the report. It has been a pleasure working with you and the City on updating your Pavement Management Plan. We look forward to the continued success of this project and future teamwork with City staff.

Sincerely,

Bucknam Infrastructure Group, Inc.

Peter J. Bucknam
Project Manager
Infrastructure Management – GIS Services

AGENCY SUBMITTAL TABLE OF CONTENTS

CITY OF HUNTINGTON BEACH PAVEMENT MANAGEMENT PLAN

- part of -

COUNTYWIDE PAVEMENT MANAGEMENT PLAN GUIDELINES
(OCTA Guideline – April 2020)

Prepared by: Bucknam Infrastructure Group, Inc.
Submitted to OCTA: June 30, 2022

I. Pavement Management Plan Certification

The City of Huntington Beach, CA certifies that is has a Pavement Management Plan in conformance with the criteria stated in the Orange County Transportation Authority Ordinance No. 3. This ordinance requires that a Pavement Management Plan be in place and maintained to qualify for allocation of revenues generated from renewed Measure M (M2).

The plan was developed by Bucknam Infrastructure Group, Inc. using MicroPAVER, a pavement management system conforming to American Society for Testing and Materials (ASTM) Standard D6433, and contains, at a minimum, the following elements:

- Inventory of Master Plan of Arterial Highway (MPAH) and Local routes reviewed and updated biennially. The last update of the inventory was completed on March, 2022 for the Arterial (MPAH) and March 2022 for the Local streets;
- Assessment of the pavement condition for all routes in the system, updated biennially. The last field review of the pavement condition was completed in March, 2022;
- Percentage of all section of pavement needing:
  - Preventive Maintenance = 25.1%;
  - Rehabilitation = 23.2%;
  - Reconstruction = 3.2%
- Budget needs for preventive maintenance, rehabilitation and/or reconstruction of deficient sections of pavement for:
  - Current biennial period $22,200,000;
  - following biennial period $25,200,000
- Funds budgeted or available for Preventive Maintenance, Rehabilitation and/or Reconstruction.
  - Current biennial period $21,700,000;
  - following biennial period $25,200,000
- Backlog by year of unfunded rehabilitation, restoration and reconstruction needs (See page 9);
- The Pavement Management Plan is consistent with countywide pavement condition assessment standards as described in the OCTA Countywide Pavement Management Plan Guidelines adopted by the OCTA Board of Directors.

*An electronic copy of the Pavement Management Plan (with MicroPAVER or StreetSaver compatible files) has been or will be submitted with the certification statement. A copy of this certification is being provided to the Orange County Transportation Authority.

Submitted by:

_____
Name (Print)

_____
Signed

_____
Title

_____City of Huntington Beach
Jurisdiction

_____5/19/22_____
Date

Director of Public Works

II.   EXECUTIVE SUMMARY

2022 UPDATE OF PAVEMENT MANAGEMENT PLAN (PMP)

As the City of Huntington Beach's infrastructure continues to mature Public Works priorities such as Local street maintenance and Arterial rehabilitation are key projects to City staff. With the City mostly built-out, wear and tear on the infrastructure will occur at an ever increasing rate. Pavement aging through annual weathering, dynamic and static vehicle loading, and increased usage, compounded with the increased cost of performing maintenance and rehabilitation, add to the yearly operational budget of the pavement network. System sustainability can only be achieved through proactive scheduling and the implementation of cost-efficient pavement applications.

Over the past twenty years the City has made proactive and efficient improvement regarding its overall condition status as well as greatly reduced its deferred maintenance burdens. The City's overall weighted PCI is 81.5 which is one of the above average in the County and close to the optimal industry standard PCI range of 82 to 85. Funding the Huntington Beach PMP over the next ten years will be manageable and achievable based on city management proactivity, frequent inspections, and biennial budgetary review.

In the upcoming years as the City continues to build upon this study through future inspections and maintenance work history, Huntington Beach pavement data will continue to provide reliable data. This will enhance the PMP through detailed Orange County Transportation Authority (OCTA) OC Go funding analysis, City specific budgetary reporting and level of service reporting.

The Huntington Beach PMP has been developed to assist City personnel by providing current data on the City's street network and to develop cost-effective maintenance strategies to maintain a desirable level of pavement performance on a network scale, while optimizing the expenditure of limited fiscal resources. The project consisted of analyzing the City's 2020 dataset for quality and usability. In doing this, we were tasked to generate an updated Capital Improvement Program report that identified recommendations and deficiencies in the current operating and maintenance efforts put forth by the City.

We surveyed all designated arterial, collector (MPAH) routes this past winter to assist the City in being compliant with OCTA – OC Go April 2020 guidelines. Additionally, we updated the City's unique Pavement Management – GIS layer that will continue to assist the City in analyzing pavement conditions and other attribute information through the use of ESRI ArcMap.

Bucknam Infrastructure Group reviewed the City's previous maintenance efforts and the current 2021-22 proposed street improvements for pertinent pavement information in order to generate a CIP report that identified recommendations and opportunities for improvement in the current operating and maintenance efforts put forth by the City. The result of these work efforts is this report.

Additionally, with the current I-405 expansion and its impact to the Huntington Beach Arterial network conditions, future appropriated funds will be necessary to address the accelerated deterioration that will be caused by the OCTA / I-405 detour traffic quantity/load.

III.   BACKGROUND

In late 1990, voters throughout Orange County approved a ½-cent sales tax for transportation improvements known as OC Go, formerly known as Measure M2. Funding for streets and roads are included within the sales tax and are distributed to locals agencies through both formula and a competitive method. In late 2006, the renewal of OC Go was approved by voters that would continue the ½-cent sales tax for thirty additional years, starting in 2011.

The primary of goal of this report is to comply with established guidelines from OCTA to ensure that field data collection and reporting efforts performed by outside consultants or local agency staff are consistent. This is required in order that funding allocations can be reviewed and based on agency comparable pavement conditions. Specifically, our findings and recommendations provide Public Works administrators, managers and field personnel with:

* *PMP report consistent with OCTA OC Go guidelines*

* *the present condition status of the pavement network (arterial, collector, residential and industrial streets), as a whole and of any grouping or individual component within the City;*

* *a ranked list of all streets, or segments of streets, by condition within the network;*

* *rehabilitation/maintenance needs of each street segment by year;*

* *an optimized priority maintenance and rehabilitation program based on cost/benefit analysis and various levels of funding;*

* *optimum annual pavement expenditure levels for pavement maintenance for the next seven (7) years;*

* *prediction of the life-cycle performance of the City's pavement network and each individual street section; and*

* *pavement condition data and analysis presented in GIS through ESRI ArcMap*

Pavement is a dynamic structure where deterioration is constantly occurring; thus the pavement management system needs to be updated on a regular basis to reflect these changes in pavement conditions, pavement maintenance histories, and maintenance strategies based upon budgetary constraints. In our approach to develop the City's forecasted maintenance recommendations we worked with Huntington Beach Public Works/Engineering staff in identifying unit costs for all maintenance practices used on an annual basis. Currently, based upon the City's maintenance practices and their associated unit costs, the total replacement value of the Huntington Beach pavement network is $979,764,500.   This value clearly indicates that the City's pavement network is the most valuable and essential asset to Huntington Beach. The City's use of slurry seal, AC Overlay and remove & replace (R&R) practices are typically applied at a five year, ten year and 25 year frequency respectively. These frequencies are typical but the City may see increases in deterioration rates due to environmental, load and high average daily traffic (ADT) volumes. For example, high ADT volumes along one of Huntington Beach's arterial streets will increase deterioration rates for a previously applied AC Overlay compared to a small local street. These deterioration rates are monitored through frequent inspections and functional class deterioration analysis within the City's PMP database.

FINDINGS AND RECOMMENDATIONS

Through our assessment of historical maintenance performed within the City and through our discussions with City staff the conditional data found across the network clearly shows that the City has applied strong, preventative maintenance strategies over the past decade. Pavement management involves frequent preventative maintenance; as pavement deteriorates through heavy traffic impacts, weathering and time, preventative maintenances (such as slurry seal, stop gap, etc.) have limited benefits. More aggressive maintenance applications have to be used.

Our study has shown that key overlay projects will be needed over the next seven years to maintain the network's high level of condition. Currently, the City's two major streets networks combined (Local & Arterial) hold average weighted PCI value of 81.5 ; it is our recommendation that a proactive, common sense overlay program and a continued slurry seal program be scheduled on the Local network over the next several fiscal years. This will ensure that the Local and citywide weighted PCI's will increase thus allowing for more frequent preventative maintenance in the near future. This can only happen if funding for the Local network is increased from $3.5 million per year to $6.5 million per year.

We have found and recommend the following detailed items which should be reviewed and considered for a proactive approach to the future management of the PMP:

ARTERIAL / COLLECTOR (MPAH) FINDINGS AND RECOMMENDATIONS
The actual workload requirements identified indicate that the Arterial (MPAH) street network is currently in "good" condition. To maintain this condition, it is critical that preventive maintenance and overlay activities are funded at the levels identified on page 9 to maintain a "good" network weighted average PCI value. Our MPAH findings for conditional data and recommendations for revenue expenditures are shown below:

- The MPAH network has a weighted PCI of 81.6

- The MPAH network consists of 168.7 centerline miles and 34,423,330 SF of pavement;

- Currently, 38% of the MPAH network (63.5 centerline miles) qualify for slurry seal/stop gap maintenance; 15% of the Arterial network (25.5 centerline miles) qualify for rehabilitation/reconstruction maintenance;

- At a minimum, MPAH maintenance projects should focus on the maintaining the current PCI above a weighted average of 81 over the next 7 years;

- Develop a proactive fiscal and planned approach to identify MPAH overlay projects based on the deterioration modeling within MicroPAVER;

  o Maintain the MPAH revenues at an average annual level of $5,600,000/yr for the term of the CIP to generate the PCI identified on page 9;

  o Demonstrated budget shown on page 8 is ample to increase the MPAH weighted PCI of 81.6 to 85.0 after seven years, additionally, the <u>citywide</u> deferred backlog decreases from

a level of $49.8 million to $6.8 million after seven years; and

- Perform pavement inspections on the MPAH network every two years to continue the City's solid planning model within MicroPAVER to track PCI deterioration; also follows new OCTA guidelines for Measure M2.

LOCAL FINDINGS AND RECOMMENDATIONS

The actual workload requirements identified indicate that the Local street network is currently in "good" condition. To maintain this condition, it is critical that preventive maintenance and overlay activities are funded at the levels identified on page 9 to maintain a "good" network weighted average PCI value. Our Local network findings for conditional data and recommendations for revenue expenditures are shown below:

- The Local network has a weighted PCI of 81.4;

- The Local network consists of 318.0 centerline miles and 62,397,119 SF of pavement;

- Currently, 29% of the Local network (91.4 centerline miles) qualifies for slurry seal/stop gap maintenance; 21% of the Local network (68.1 centerline miles) qualify for rehabilitation/reconstruction maintenance;

- At a minimum, Local maintenance projects should focus on the maintaining the current PCI above a weighted average of 81 over the next 7 years;

- Develop a proactive fiscal and planned approach to identify local overlay projects based on the deterioration modeling within MicroPAVER;

  o Continue to utilize the City's twelve (12) Zone Maintenance Schedule;
    ▪ Apply the proper Local budget to allow for two (2) zones to be addressed per year;
    ▪ This policy and application will generate even greater ROI in the next several years;

  o Increase the Local revenues to an average annual level of $6,500,000/yr for the term of the CIP to generate a higher weighted PCI by FY 2028-29; and

  o Demonstrated budget shown on page 8 is ample to increase the Local weighted PCI of 81.4 to 83.4 after seven years, additionally, the citywide deferred backlog decreases from a level of $49.9 million to $6.8 million after seven years; and

- Perform pavement inspections on the Local network every six years to continue the City's solid planning model within MicroPAVER to track PCI deterioration; also follows new OCTA guidelines for Measure M2

- The City consideration and future action to condense their twelve (12) Local Maintenance zones to six (6) zones by] 2022-23 is showing through our PMP modeling to extremely advantageous.

IV.   CURRENT PAVEMENT CONDITIONS (PCI)

Rank	Mi.	SF	PCI 2022	2020	2018	2016	2014	2012	2010	2008	2006	2003
MPAH	168.7	34,423,330	81.6	80.2	76.1	74.7	76.5	76.4	73.4	69.7	64.2	54.1
Local	318.0	62,397,119	81.4	77.2	76.5	77.6	78.7	72.1	71.6	62.6	64.0	68.1
Citywide	486.7	96,820,449	81.5	78.9	76.4	76.7	77.9	73.5	72.3	65.1	64.1	63.1
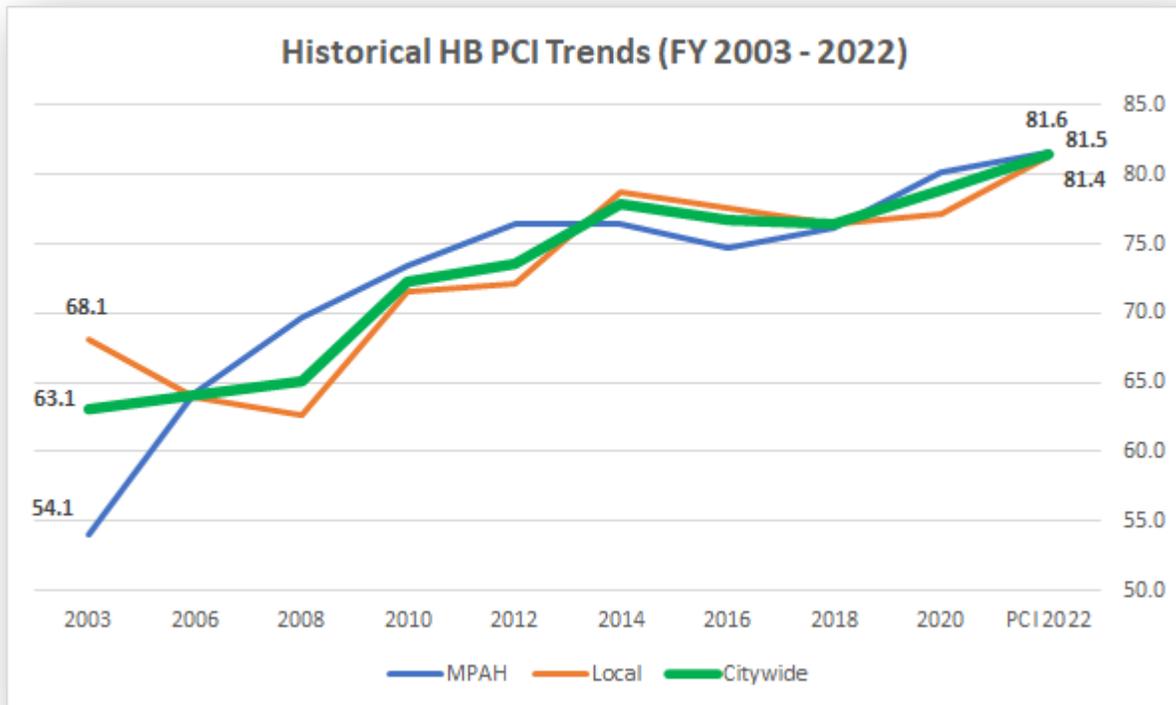
Condition	PCI Range	MPAH	Locals	Total Mi.	% of Network
Very Good	(86-100)	77.6	158.6	236.2	48.5%
Good	(75-85)	50.5	71.4	122.0	25.1%
Fair	(60-74)	26.3	46.7	73.0	15.0%
Poor	(41-59)	11.4	28.4	39.8	8.2%
Very Poor	(0-40)	2.8	13.0	15.7	3.2%
		168.7	318.0	486.7	

V.   PROJECTED PAVEMENT CONDITIONS (PCI) – Current Funding

HB MPAH / Local Annual Budget Schedule				Entire Network	MPAH	Local
Fiscal Year	MPAH	Local	Total $	81.5	81.6	81.4
2022-23	$5,600,000	$3,500,000	$9,100,000	81.9	82.1	81.8
2023-24	$5,600,000	$7,000,000	$12,600,000	83.6	83.9	83.4
2024-25	$5,600,000	$7,000,000	$12,600,000	84.6	84.6	84.5
2025-26	$5,600,000	$7,000,000	$12,600,000	85.5	85.6	85.5
2026-27	$5,600,000	$7,000,000	$12,600,000	85.6	85.8	85.6
2027-28	$5,600,000	$7,000,000	$12,600,000	85.0	85.8	84.7
2028-29	$5,600,000	$7,000,000	$12,600,000	83.9	85.0	83.4
	$39,200,000	$45,500,000	$84,700,000			

Projected PCI Based on Current Funding (FY 2022-2029)
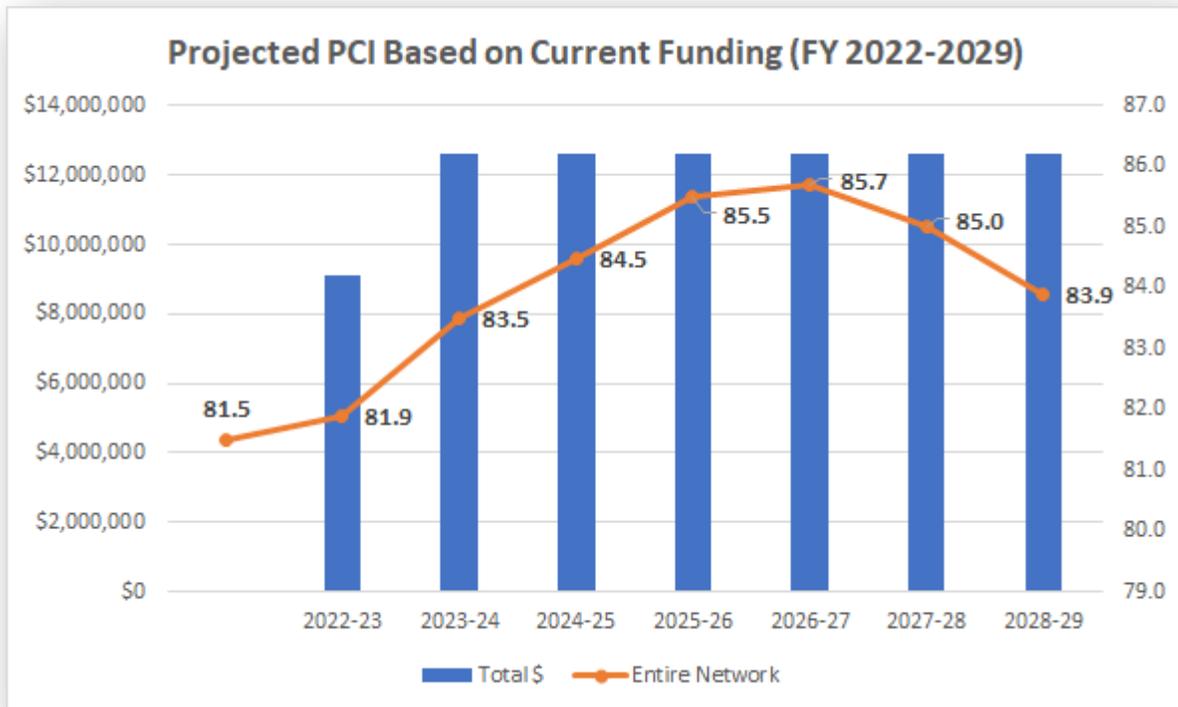
VI.   ALTERNATIVE FUNDING LEVELS

Maintain Existing Average Network PCI

Fiscal Year	Maintain PCI Funding	Entire Network	MPAH	Local
Today	~	81.5	81.6	81.4
2022-23	$7,612,700	81.4	82.0	80.8
2023-24	$7,508,500	81.5	82.3	81.0
2024-25	$7,478,000	81.6	83.1	81.1
2025-26	$7,493,800	82.4	83.3	81.7
2026-27	$7,443,200	82.4	83.3	81.7
2027-28	$7,515,000	81.9	82.7	81.6
2028-29	$7,605,800	81.3	82.0	81.5
Total	$52,657,000			

Improve Average Network PCI

Fiscal Year	Increase PCI Funding	Entire Network	MPAH	Local
Today	~	81.5	81.6	81.4
2022-23	$9,100,000	81.9	82.1	81.8
2023-24	$12,600,000	83.5	83.7	83.4
2024-25	$12,600,000	84.5	84.4	84.5
2025-26	$12,600,000	85.5	85.4	85.5
2026-27	$12,600,000	85.7	85.9	85.6
2027-28	$12,600,000	85.0	85.9	84.7
2028-29	$12,600,000	83.9	85.0	83.4
Total	$84,700,000			

* City's Actual Funding budget satifies the Increase PCI Budget (PCI results are then identical)

VII.   CURRENT AND PROJECTED BACKLOG BY YEAR OF PAVEMENT MAINTENANCE NEEDS

Plan Year	Actual Funding Backlog	Maintain PCI Backlog	Increase PCI Backlog *
Current	$49,815,200	$49,815,200	$49,815,200
2022-23	$43,859,200	$43,041,100	$43,859,200
2023-24	$37,570,300	$40,768,900	$37,570,300
2024-25	$29,563,400	$37,819,400	$29,563,400
2025-26	$20,858,900	$34,462,500	$20,858,900
2026-27	$11,748,500	$37,096,100	$11,748,500
2027-28	$6,982,500	$35,445,400	$6,982,500
2028-29	$6,817,500	$41,298,700	$6,817,500

* City's Actual Funding budget satifies the Increase PCI Budget (Backlog results are then identical)

DEFERRED MAINTENANCE

Delaying repairs on streets where pavement conditions indicate a need generates deferred maintenance or "backlog". Deferred maintenance is work that is postponed to a future budget cycle, or until funds are available. As maintenance is deferred, the opportunity to apply preventive, life extending pavement treatments is forfeited and the ultimate cost of rehabilitation multiplies (i.e. slurry seal costs to overlay costs). By using the City's pavement maintenance applications and their associated unit costs, when a budgetary model is exercised within the PMP software the amount of deferred maintenance is calculated. Based upon the available budget applied to the model, deferred maintenance will increase or decrease.

As maintenance is deferred, the opportunity to apply life extending preventive pavement applications is lost and the ultimate cost of rehabilitation multiples.

VIII.   CENTERLINE MILEAGE

Rank	W. PCI	Mi.	SF
MPAH	81.6	168.7	34,423,330
Local	81.4	318.0	62,397,119
Citywide	81.5	486.7	96,820,449

IX.   PERCENTAGE OF NETWORK IN EACH OF FIVE CONDITION CATEGORIES BASED ON CENTERLINE MILES

Condition	PCI Range	Network	Percent Area of Total Pavement	Area of Pavement (SF)	Percent Centerline Mi. of Network	Centerline Mileage of Network
Very Good	(86-100)	MPAH	16.1%	15,594,548	15.9%	77.6
		Local	32.2%	31,165,582	32.6%	158.6
Good	(75-85)	MPAH	11.1%	10,774,635	10.4%	50.5
		Local	14.5%	14,080,023	14.7%	71.4
Fair	(60-74)	MPAH	5.3%	5,164,008	5.4%	26.3
		Local	9.4%	9,142,423	9.6%	46.7
Poor	(41-59)	MPAH	2.4%	2,344,528	2.3%	11.4
		Local	5.7%	5,558,600	5.8%	28.4
Very Poor	(0-40)	MPAH	0.6%	545,611	0.6%	2.8
		Local	2.5%	2,450,491	2.7%	13.0

X.   REDUCTION IN M2 LOCAL MATCH

A local agency match reduction of 10% of the eligible cost for projects submitted for consideration of funding through the M2 Comprehensive Transportation Funding Programs (CTFP) call for projects is available if the local agency either:

a.   Shows measurable improvement of paved road conditions during the previous reporting period defined as an overall weighted (by area) average system improvement of one Pavement Condition Index (PCI) point with no reduction in the overall weighted (by area) average PCI in the Master Plan of Arterial Highways (MPAH) or local categories:

or

b.   Have road pavement conditions during the previous reporting period, within the highest 20% of the scale for road pavement conditions in conformance with OCTA Ordinance No. 3, defined as a PCI of 75 or higher, otherwise defined as in "good condition".

Road conditions found through our 2022 PMP management study shows that the City is eligible for Local Match Reduction based on the current network weighted PCI of 81.5. Additionally, the City of Huntington Beach has demonstrated with the enclosed budget projection (page 8) that the City's weighted average PCI (by area) remains above a PCI of 75 after the seven year program.

XI.   APPENDIX A – SEVEN YEAR ROAD MAINTENANCE AND REHABILITATION PLAN BASED ON CURRENT OR EXPECTED FUNDING LEVEL

XII.   APPENDIX B – COMPLETE STREET LISTING CURRENT CONDITIONS

XIII.   APPENDIX C – GIS DIGITAL DATA

Introduction

The OCTA GIS Section maintains a spatial inventory of transportation infrastructure which mostly consists of major arterial streets, roads, and highways. A key component of road information is pavement condition. Maintaining an inventory of pavement condition will enhance OCTA's GIS visualization and analysis capabilities and assist in understanding the transportation investment needs throughout the region. Therefore, a GIS dataset in digital format should be included in this report.

Structure of GIS Data

The GIS dataset must consist of linear geographic features that represent road/street segments. All segments that are part of the report should be included in the GIS dataset. The attribute information of each segment should generally follow the format of the Complete Listing of Current Street Conditions in Appendix B above.

The GIS data requirements are discussed below. Most commercial and open-source GIS software provide industry-standard tools to manage GIS data to meet these requirements.

GIS Digital Data Format

The GIS data must be submitted in either one of the following formats:

- Esri Shapefile, or
- Esri File Geodatabase

Metadata

The GIS data are required to have associated metadata. The minimum metadata items required are:

- Title of Dataset
- Tags (A set of words that can be used by GIS to search for the resource. For example: "pavement", "transportation", "roads")
- Summary (A brief purpose statement of the dataset)
- Description (A brief narrative of the dataset's content)
- Credits (A recognition of those who created or contributed to the resource)

Spatial Geometry Type

The spatial geometry of the segment features must be lines that represent the roadway centerline as accurately as possible.

Projection

The GIS data must have spatial reference information and have its coordinate system identified and embedded in or associated with the data file(s). All GIS data submitted to OCTA should be in the following projected coordinate system:

- NAD 1983 State Plane California VI FIPS 0406 (US Feet) - More information about this system can be found at: https://spatialreference.org/ref/epsg/nad83-california-zone-6-ftus/

GIS Feature Attributes

The required segment attributes are:

- Street name
- Unique segment identifier (Segment ID from original source if available)
- Name of intersecting road at the beginning of a segment
- Name of intersecting road at the end of the segment
- Current pavement condition index (PCI)
- Current PCI inspection date
- Length of road segment in feet
- Width of road segment in feet
- Paved area of road segment in square feet or square yards
- Projected PCI at end of Seven-Year Road Maintenance and Rehabilitation Plan

Additional attributes such as number of through travel lanes, direction of travel and pavement surface type may be provided. An example of a GIS attribute table for road segments is shown below (Note that there are additional attributes such as surface, functional class, and number of travel lanes).

XIV.   APPENDIX D – QUALITY ASSURANCE / QUALITY CONTROL PLAN

Introduction

When performing data collection in any field, the need for quality control is paramount as it is essential for accurate planning, analysis and design. This is particularly true for collecting pavement distress data for a pavement management program.

The Quality Assurance / Quality Control (QA/QC) Plan establishes minimum quality standards for performance and procedures for update of the pavement management program.

Objectives

This document constitutes a formal QA/QC Plan for the City of Huntington Beach. It was prepared on March, 2018 and last revised in March, 2018.

Specifically, it is intended for the 2022 Pavement Management Plan Update. The focus is on the collection of network-level pavement distress data (defined by National Cooperative Highway Research Program (NCHRP) Synthesis 401 Quality Management of Pavement Data Collection, as "Network-level data collection involves collection of large quantities of pavement condition data, which is often converted to individual condition indices or aggregated into composite condition indices".

This document also addresses the QA/QC plan requirements of the Orange County Transportation Authority (OCTA)'s "Countywide Pavement Management Plan Guidelines" (Section 2.4), adopted in May 2010.

Structure of QA/QC Plan

The following components are addressed in this QA/QC Plan:

- Condition survey procedures used;
- Accuracy required for data collection;
- Inspector qualifications and experience; and
- Safety.

Condition Survey Procedures

The governing document in performing condition surveys for the City of Huntington Beach is ASTM D6433-18 "Standard Practice for Roads and Parking Lots Pavement Condition Index (PCI) Surveys." Both asphalt concrete (AC) and Portland cement concrete (PCC) pavements are included in this protocol. The following distresses are collected for each pavement type:

Asphalt Concrete	Portland Cement Concrete (Jointed)
1. Alligator (fatigue) cracking	1. Blow-up/Buckling
2. Bleeding	2. Corner Breaks
3. Block Cracking	3. Divided Slab
4. Bumps and sags	4. Durability ("D") Cracking
5. Corrugation	5. Faulting
6. Depression	6. Joint Seal damage
7. Edge Cracking	7. Lane/Shoulder Drop-off
8. Joint Reflection Cracking	8. Linear Cracking
9. Lane/Shoulder Drop-off	9. Patching (large) and Utility Cuts
10. Longitudinal & Transverse Cracking	10. Patching (small)
11. Patching and Utility Cut Patching	11. Polished Aggregate
12. Polished aggregate	12. Popouts
13. Potholes	13. Pumping
14. Railroad Crossing	14. Punchout
15. Rutting	15. Railroad Crossing
16. Shoving	16. Scaling, map cracking and crazing
17. Slippage Cracking	17. Shrinkage Cracks
18. Swell	18. Spalling (corner)
19. Weathering	19. Spalling (joint)
20. Raveling	

As required by the Orange County Transportation Authority (OCTA), the City of Huntington Beach must prepare and implement a quality assurance / quality control (QA/QC) plan regarding pavement management inspection as they pertain to MicroPAVER. For the purposes of this report, Bucknam has demonstrated below how our project team implemented QA/QC procedures during the project.

Our QA/QC plan focuses on the how each pavement inspection is performed, what distresses are collected and ensures that it complies with the OCTA guidelines defined within the "Countywide Pavement Management Plan Guidelines (CPMPG)".

As shown within the OCTA (CPMPG), our staff followed and delivered on the requirements stated within Chapter 2, page 2-5 which require specific QA/QC data (Items A through G). Additionally, Chapter 3 requires numerous data/deliverables from local agencies for OC Go eligibility. All general PCI budgetary report submittals will follow the Chapter 3 guidelines.

In conjunction with the outlined items within the CPMPG Section 2 we have summarized our QA/QC procedures below:

a. **Descriptions of condition survey** - Our staff follows the required Condition Survey Protocols (CPMPG, Chapter 2); our staff assesses each pavement section for the minimum distresses outlined within Chapter 2, page 2-1. Additionally, based on the pavement conditions found, we collect all MicroPAVER/StreetSaver Army Corps of Engineers (ACOE) distresses, if found within the sample sections; for example, if slippage cracking, potholes, etc. are found our survey technicians record the proper information.

b. **How data was collected** - Our surveys follow the OCTA accepted walking requirements. All sections that our staff surveys are performed through the walking method, approximately 10% of all sections surveyed were complemented with windshield surveys based on unique conditions found. Our staff physically measures the width of every section as well as measure for any square footage adjustment that need to be added or taken away from a sections "true area" (i.e. cul-de-sac, bus pads, street width variances, etc.). Samples taken always include a minimum of 2,500 SF coverage unless specific section limits prohibit this. Arterial section samples utilize a 3,500 SF sample size due to the larger section area (this is within the ASTM D6433-18 sample size calculation. Field crews typically include one individual for residential pavement sections while Arterial (MPAH) routes utilize a two-person crew for safety, traffic control and increases quality control.

c. **Accuracy required for data collection** - We use a statistical sampling approach for measuring the quality of our field technician's work. In this manner, 10 percent of the original surveys are re-surveyed by a different survey crew than the original, supervised by a field supervisor, and the results are compared to the original surveys. Our QC process involves checking the field crews' work in a "blind study" fashion. Quality control checks are performed at the end of each survey week. This ensures that all field personnel are properly collecting section samples, distress types and distress severities for all street segments.

   ❖ When QA/QC issues are found, our staff documents the issues within MicroPAVER's user interface. If distress types found are not within the 97% accuracy our QA/QC is expanded beyond our minimum 10% resurvey to 20% of the original survey

d. **Random and Systematic Re-Inspections** – As described above our staff re-inspects, as a minimum, 10% of the original survey (OCTA only requires 5%). Per the agencies requests, our staff will submit PCI reports to the agency as project status reports for their review. Agencies will typically review specific pavement sections for PCI accuracy based on recent overlay or slurry seal maintenance; this serves as an initial accuracy check on our surveys (outside Bucknam QC efforts). Additionally, our staff performs "ride-a-long" surveys with local agency staff to build consensus on how our MicroPAVER/StreetSaver ACOE surveys are performed, recorded and reported on.

   Random re-inspections will include a representative selection across the following categories:

   - Functional classed (i.e. MPAH, locals);

   - Surface types (e.g. AC or PCC);

   - Pavement conditions (e.g. good, fair, poor);

   - Inspectors;

   - Geographical areas, if applicable.

For systematic re-inspections, this could be due to noticed trends such as specific treatment types (e.g. open-graded mixed), a specific inspector or geographical area. In these cases Bucknam continues to utilize a 10% re-inspection policy.

e. **PCI Comparison with Past Surveys** - if previous inspection data is available, new PCI's calculated through the most recent inspections will be compared to previous PCI's. If the variance in PCI is greater than +/- 10 PCI points, these sections will be flagged for further investigation and/or re-inspection (In the cases that a PCI increases or decreases by 10 points follows the established CPMPG guidelines; Appendix A, page A-18).

f. **Schedule of data submittal** – Pending on the City's last major PMP submittal, Bucknam will assist the agency in submitting the following:

   ❖ Master Plan of Arterial Highways (MPAH) routes will be surveyed and reported on at least once every two years

   ❖ Local streets will be surveyed and reported on every six years

   ❖ Corresponding MPAH and local PCI reporting and budgetary reporting will be submitted every two years

g. **Experience of Inspectors** – Bucknam staff have been trained on the use of MicroPAVER and the ACOE MicroPAVER segment calibration and inspection practices. Mr. Peter Bucknam (Project Manager) and Mr. Shaun Russo (Lead Field Tech) have completed the MicroPAVER Certification of Professional Development courses. All Bucknam field technicians are trained using the ACOE survey methodologies and have passed OCTA's prequalification testing.

Bucknam Infrastructure Group inspectors have attended formal training on pavement condition distress surveys. This training was conducted prior to performing any work using the ASTM D6433-18 protocols, consistent with OCTA's requirements.

Inspector Name	Date of ASTM D6433-18 Training	Training Conducted by
Shaun Russo	3/1/2019	OCTA
Aaron Cohodas	2/15/2020	OCTA
Josh Logsdon	2/15/2020	OCTA
Cade Bucknam	2/15/2020	OCTA

h. **Field data collection safety procedures** – Bucknam field survey techniques utilize the following procedures:

   a. All vehicles are properly marked or flagged with appropriate sign markings indicating that a "PAVEMENT SURVEY IS IN PROGRESS"

   b. All vehicles have the proper flashing amber light beacons placed on the top of the vehicle to allow for proper visibility and line-of-site warning

   c. Large MPAH routes are surveyed using two field technicians to increase traffic control warning and safety

   d. While parking or stopping along the survey route, vehicles legally park within the right-of-way or use a parking lot

   e. All field technicians wear ANSI – 105 Class II safety vests

XV.   APPENDIX E – PAVEMENT MANAGEMENT DATA FILES

The City of Huntington Beach MicroPAVER database (.e70 file) has been enclosed for City and OCTA use. This data and the associated reporting data includes:

- Street names and limits for the City's public streets
- Street identifiers (Branch ID, Section ID)
- Direction
- Begin and end of section
- Length, width and true areas
- Functional Classification (MPAH, Local)
- Number of travel lanes
- Pavement Condition Index (PCI) and date of inspection
- Type of recommended treatment
- Cost of recommended treatment

XVI. APPENDIX F – GIS MAPS / CURRENT
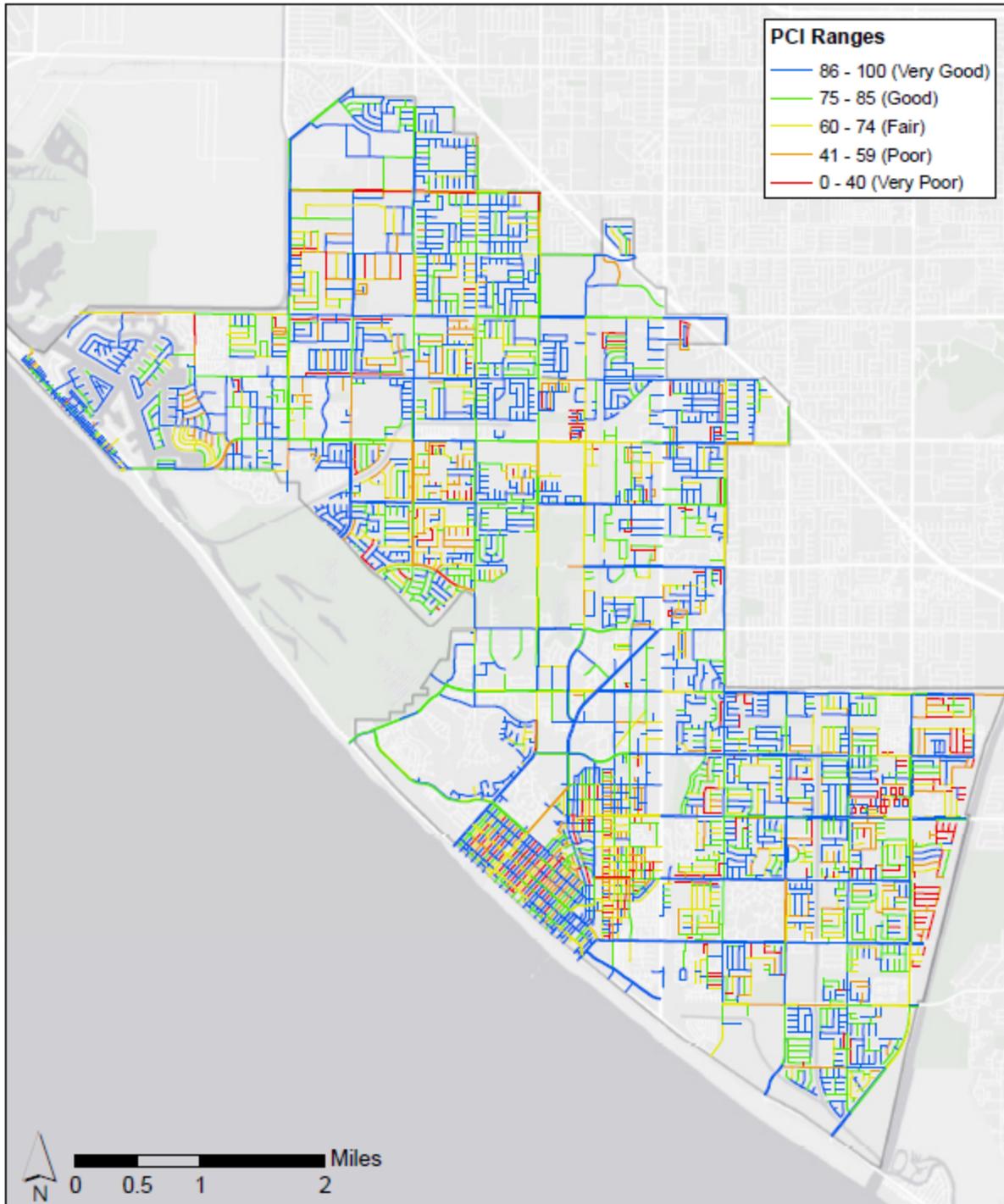
City of Huntington Beach, CA
Current Conditions 2022