Appendix B – Pavement Management Program Report

DRAFT

PAVEMENT MANAGEMENT PROGRAM REPORT

MARCH JOINT POWERS AUTHORITY OWNED CIVILIAN AVIATION AREA
MARCH INLAND PORT
RIVERSIDE COUNTY, CALIFORNIA

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EXECUTIVE SUMMARY

The March Joint Powers Authority contracted C&S Engineers Inc. to perform a Pavement Management Program (PMP) for the Civilian Aviation Area at March Inland Port. Development of the plan required record drawing research to divide the pavement areas into sample units based on construction history and in accordance with FAA Advisory Circular 150/5380-7B. After this was complete, a site visit was performed to assess the existing condition of the pavement sections. Construction dates and existing conditions were then entered into the PAVER™ software program for analysis of the pavement. From this information, future conditions were calculated for the pavements at the Civilian Aviation Area at March Inland Port. Findings were shared with the March Joint Powers Authority and the airport's ACIP was modified in accordance with the PMP results.

Condition

The Pavement Condition Index (PCI) is calculated based on the results of a visual condition survey in which distress types, severity, and quantities are identified. The area-weighted pavement condition index (PCI) for the airfield pavements that were inspected in 2022 is 58. The PCI is calculated based on the results of a visual condition survey in which distress types, severity, and quantities are identified. Table 1 (below) and Figure 1 - PCI Condition Map (page 2) provide a tabular and visual overview of the area-weighted PCIs. For the analysis performed in this report, rehabilitation is recommended for a PCI between 46 & 65 for a taxiway or apron. A total of 12 pavement sections were inspected in 2022. Table 1 shows a condensed version of the area-weighted PCI for the airfield pavements. A more detailed version is located in Appendix F.

Table 1
Area-Weighted PCI by Pavement Use

Pavement Use (Branch Name)	Area-Wt. PCI	Pavement Area, Sq.Ft.	% of Total Pavement Area
Taxiways	56	250,876	20
Apron	58	1,012,974	80
Overall	*58*	*1,263,850*	*100*

Capital Improvements

The PAVER™ software was used to generate PCIs and to evaluate pavement rehabilitation and reconstruction needs at the Civilian Aviation Area at March Inland Port. The program is also able to forecast future pavement conditions. A five and ten year forecast map of PCI conditions are shown in Figure 2 (page 4) and Figure 3 (page 5), respectively and is shown in tabular form in Appendix F. Based upon the forecasted conditions, an analysis was performed to identify a prioritized plan for major rehabilitation and reconstruction projects. The results from the PAVER™ software were used as a basis for determining a logical pavement rehabilitation and reconstruction program that would be incorporated into the Airport Capital Improvement Program (ACIP) for the Civilian Aviation Area at March Inland Port. The recommended strategy was discussed with the March Joint Powers Authority and it was agreed that the Authority will attempt to modify the ACIP to align with the Pavement Management Program (PMP) results to the maximum extent practicable. Details of the pavement rehabilitation program are presented in Appendix E.

The estimated total cost to complete the 10-year pavement rehabilitation program is TBD. See Section 8 and Appendix E for a detailed breakdown of the 10-year project costs. These project costs should be used for future capital programming purposes and referenced when updating the Airport Capital Improvement Program (ACIP) for the Civilian Aviation Area at March Inland Port.

TABLE 8-1 – ACIP PROJECTS - TBD

PRIORITY	DESIGN YEAR	PROJECT	CONSTRUCTION YEAR	COST*
1	2023	AP-5 Routing and Cracking	2023	County Maintenance Budget
2	2023	Phase 1 Taxiway G Reconstruction	2025	$1,784,820
3	2024	AFUEL-1 Routing and Cracking	2024	County Maintenance Budget
4	2024	Phase 2 Taxiway G Reconstruction	2026	$1,937,400
5	2025	Phase 3 Taxiway G Reconstruction	2027	$1,937,400
6	2026	Phase 4 Taxiway G Reconstruction	2028	$1,936,200
7	2027	Phase 5 Taxiway G Reconstruction	2029	$1,899,840
8	2028	Phase 6 RON-1 Reconstruction	2030	$1,803,600
9	2029	Phase 7 RON-1 Reconstruction	2031	$1,936,200
10	2030	Phase 8 RON-1 Reconstruction	2032	$1,915,620
11	2031	Phase 9 RON-1 Reconstruction	2033	$1,920,420
12	2032	Phase 10 RON-1 Reconstruction	2034	$1,920,420
				TOTAL: $18,991,920

*Costs are based on total construction and design costs. They include a 2% inflation from the total 2022 cost estimates located in Appendix E.

2. INTRODUCTION

2.1 General

This report has been prepared to document the results of a Pavement Management Program (PMP) for the Civilian Aviation Area at March Inland Port, which is owned and operated by the March Joint Powers Authority. This program serves to evaluate and document the current pavement condition, including observed pavement distresses, along with a comprehensive historic listing of maintenance and rehabilitation improvements performed throughout the airfield.

C&S Engineers, Inc. (C&S) has performed an airport-wide pavement investigation and developed a long term pavement maintenance and rehabilitation program for the Airport.

The ultimate objective of the PMP is to develop a prioritized list of pavement rehabilitation and reconstruction projects, and also identify scheduled pavement maintenance type activities in such a way that the network of pavements can be maintained in a serviceable condition in the most cost-effective manner. The PMP is also used as a reference document to help program preventive maintenance work at specific intervals which would extend the life of the pavement.

Through the use of PAVER™, which was developed by U.S. Army Corps of Engineers, data from the current field investigation was used to develop a recommended and prioritized list of projects. The software was also used to forecast future pavement conditions that simulate completion of the prioritized projects.

2.2 Project Background

Historically, most airport owners have made decisions regarding pavement maintenance and rehabilitation (M&R) based on experience and judgment rather than using documented data and an objective approach. Over the past decade, Pavement Management technology has been developed to assist airport owners, facility managers, budget directors and engineers do a better job in proactively planning pavement M&R so that cost effective treatments may be applied at optimum time intervals in a pavement's life cycle. A PMP may be defined as an objective method of prioritizing maintenance and rehabilitation work for a network of pavements such that optimal use is made of the Airport Owner's funds. Through the use of a PMP, an inventory of the pavement system is established and a cost effective maintenance program is developed to define which pavements should be rehabilitated, how they should be rehabilitated and when they should be rehabilitated.

Pavement Management Programs have been implemented at many airports over the past several years. In recognition of the long term benefits of PMP's, the Federal Aviation Administration (FAA) has required that owners utilize a PMP to support any requests for Federal funding of airport pavement replacement or reconstruction projects after January 1, 1995. The intent of the requirement is to assure the FAA that owners are evaluating pavement conditions in an objective manner and selecting properly timed M&R treatments to ensure that federal funds are being spent in an optimal manner.

2.3 Scope of Work Performed

The following services were performed to generate this report:

- **Research Historical Records** - To determine pavement construction and maintenance history and to document existing pavement structure composition.
- **Develop Network Segmentation** - To subdivide the pavement into "sections" and "sample units" based on construction history for inspection and maintenance management purposes.
- **Perform Pavement Condition Survey** - To identify and quantify existing pavement distresses in an objective manner using established criteria.
- **Development of Engineering Strategies** - To set criteria for determination of short and long term pavement maintenance and rehabilitation strategies.
- **Conduct Network Analysis** - To forecast future pavement conditions, select specific maintenance and rehabilitation treatments, prepare cost estimates, and develop a prioritized list of projects.
- **Develop Capital Improvement Program** - To summarize results of network analysis and identifying recommended pavement maintenance and rehabilitation projects over a 10-year period.

3. HISTORICAL DATA

Record plans were studied and a pavement construction and maintenance history compiled for all airside pavements. This information was used to assist in segmenting the network of pavements for maintenance management purposes. The information will also be useful for future in-depth evaluations and rehabilitation designs. The historical data is summarized in Table 3-1:

TABLE 3-1 – SUMMARY OF PAVEMENT HISTORY

BRANCH NAME	SECTION NAME	CONSTRUCTION HISTORY	EXISTING PAVEMENT SECTION
Taxiway G	TW G-1	1959 – Original Construction	17" PCC Pavement 5" Bituminous Base Course 6" Crushed Aggregate Base Course
Taxiway G	TW G-2	2008 – Original Construction	18" PCC Pavement 6" Cement Treated Base Course 4" Subbase Course
Taxiway G	TW G-3	2018 – Original Construction	17" PCC Pavement 5" Bituminous Base Course 6" Crushed Aggregate Base Course
Taxiway H	TW H-1	2015 – Original Construction	9" PCC Pavement 6" Aggregate Base Course
Apron	AP-1	2015 – Original Construction	9" PCC Pavement 6" Aggregate Base Course
Apron	AP-2	2015 – Original Construction	22" PCC Pavement 6" Aggregate Base Course
Apron	AP-3	2006 – Original Construction	22" PCC Pavement 6" Aggregate Base Course

Apron	AP-4	2006 – Original Construction	8” PCC Pavement 6” Aggregate Base Course
Apron	AP-5	2015 – Original Construction	8” PCC Pavement 6” Aggregate Base Course
Tie-Down Apron	ATD-1	2015 – Original Construction	9” PCC Pavement 6” Aggregate Base Course
Fuel Apron	AFUEL-1	2009 – Original Construction	10” PCC Pavement 4” Aggregate Base Course
Remain Overnight Apron	RON-1	1959 – Original Construction	22” PCC Pavement 6” Aggregate Base Course

4. PAVEMENT INVENTORY AND NETWORK DEFINITION

Based on the contents of the pavement inventory, including the pavement use, surface type, and structural composition, the network of airside pavements was divided into smaller, more manageable components for inspection and maintenance management purposes. A description of the three network components is provided below.

a. **Branches** - defined as any identifiable part of the pavement network which is a single entity and has a distinct function. For the Civilian Aviation Area at March Inland Port, individual branches were identified for the Taxiways and Aprons.

b. **Sections** - defined as pavement segments of similar structure, age and use.

c. **Sample Units** - defined as a convenient area of a pavement section which is designated only for the purpose of pavement inspection. For bituminous concrete airfield pavements, ASTM D5340-12 recommends that sample unit areas should measure 5,000 sq. ft. with a tolerance of +/- 2,000 sq. ft. For PCC pavements, sample units are defined by slabs rather than by area. Each sample should have between 12 and 28 slabs, with a target number of 20 slabs.

Pavement Condition Plans showing the Branches, Sections and Sample Units are included in Appendix A.

5. PAVEMENT CONDITION SURVEY AND RATING PROCEDURE

5.1 Overview

The most useful feature of an effective PMP is the ability to determine both the current condition of a pavement network and predict pavement condition over a specified time period. To predict conditions reliably, an objective, repeatable rating system for identifying the pavement's present condition must be used. The Pavement Condition Index (PCI) Rating System, developed by the FAA and the United States Army Construction Engineering Research Laboratory (CERL), is widely accepted for use on airfield pavements.

The PCI procedures, described in FAA Advisory Circular 150/5380-7B and ASTM D5340, were utilized for this survey.

The PCI is a numerical pavement condition rating ranging from 0 to 100, with 0 indicating a failed pavement and 100 indicating a pavement in perfect condition. Table 5-1 shows the relationship between PCI and a descriptive rating of conditions.

Table 5-1

PCI Numerical Ratings

PCI Range	Description
100 to 86	Good
85 to 71	Satisfactory
70 to 56	Fair
55 to 41	Poor
40 to 26	Very Poor
25 to 11	Serious
10 to 0	Failed

The PCI is calculated based on the results of a visual condition survey in which distress types, severity, and quantities are identified. For flexible pavements, ASTM D5340-20 Standard Test Method for *Airport Pavement Condition Index Surveys* identifies seventeen distinct distress types that are commonly considered. For rigid pavements, sixteen distinct distresses are commonly considered. The PAVER™ software program utilizes coding that is synonymous with the particular distress. See summary of distresses and respective coding for flexible and rigid pavements in Table 5-2 and Table 5-3.

Table 5-2
Flexible Pavement Distress Types

PAVER™ Distress Code No.	DISTRESS TYPE	PAVER™ Distress Code No.	DISTRESS TYPE
41	Alligator or Fatigue Cracking	49	Oil Spill Damage
42	Bleeding	50	Patching and Utility Cut Patch
43	Block Cracking	51	Polished Aggregate
44	Corrugation	52	Raveling
45	Depression	53	Rutting
46	Jet Blast Erosion	54	Shoving of Asphalt Pavement by PCC slabs
47	Joint Reflection Cracking from PCC (Longitudinal & Transverse)	55	Slippage Cracking
48	Longitudinal & Transverse Cracking (Non-PCC Reflection)	56	Swelling
		57	Weathering

Table 5-3
Rigid Pavement Distress Types

PAVER™ Distress Code No.	DISTRESS TYPE	PAVER™ Distress Code No.	DISTRESS TYPE
61	Blowup	69	Pumping
62	Corner Break	70	Scaling
63	Cracking	71	Settlement, Faulting
64	Durability (“D”) Cracking	72	Shattered Slab
65	Joint Seal Damage	73	Shrinkage Cracking
66	Patching, Small	74	Spalling, Joint
67	Patching, Large	75	Spalling, Corner
68	Popouts	76	Alkali-Silica Reactivity (ASR)

Distresses can be grouped into three major categories; Load-Related, Climate/Durability Related and Other. Load-Related distresses include Alligator Cracking, Raveling, Linear Cracking, Corner Breaks, and Shattered Slabs. Climate/Durability Related distresses include Block Cracking, Joint Reflection Cracking, Longitudinal & Transverse (L&T) Cracking, Patching, Raveling, Durability Cracking, and Joint Seal Damage. Other Related distresses include Bleeding, Corrugations, Depressions, Jet Blast Erosion, Oil Spillage, Polished Aggregate, Shoving, Slippage Cracking, Swelling, Patching, Popouts, Scaling, Faulting, Joint and Corner Spalling, and Alkali Silica Reactivity (ASR). PAVER™ considers the general condition of the pavement to determine which category each distress goes into when calculating the percentage of related distresses.

Field verification of the PCI inspection method has shown that the index gives a good indication of a pavement's structural integrity and operational condition. Also, analysis of the existing distress types in the pavement is necessary to enable accurate deterioration forecasts on which rehabilitation strategies can be based.

5.2 Calculation of PCI

The degree of pavement deterioration is a function of distress type, distress severity, and amount or density of particular distresses. Because of the large number of possible distress combinations, "deduct values" are used as a weighting factor to indicate the effect that each particular distress type, severity level, and distress density combination has on pavement condition. Based on input from field-testing and evaluating the procedure, accurate descriptions of distress types, severity levels, and the corresponding deduct values were derived so that a composite distress index (the PCI) could be determined. Deduct curves for all distress types and combinations of distresses are presented in ASTM D5340-20. PAVER™ software program incorporates these deduct curves for the distress types.

5.3 Pavement Inspection and Sampling Techniques

Research has shown that it is not necessary to inspect all sample units to obtain a representative PCI for the purpose of condition assessment and rehabilitation selection. The degree of confidence in the survey is a function of density (percentage of sample units inspected), total number of samples and the variability of pavement conditions. Based on industry standard practices, the minimum sampling schedule for asphalt and portland cement concrete pavements is shown in Table 5-4.

Table 5-4
Typical Recommended Sampling Density

Total Sample Units	Samples to be Inspected
1-5	1
6-10	2
11-15	3
16-40	4
Over 40	10%

The sampling guidelines in Table 5-4 were used for the pavement evaluation at the Civilian Aviation Area at March Inland Port.

One of the limitations of random sampling is that sample units in exceptionally good condition or bad condition or containing atypical distresses that may exist in the Section are not necessarily included in the survey. To overcome this limitation, the inspectors identify any unusual sample units and inspect them as "additional sample units" rather than randomly selected units. When "additional sample units" are included in the survey, the calculation of the PCI is slightly altered to prevent extrapolation of the unusual conditions across the entire feature. This procedure is discussed in more detail in Advisory Circular 150/5380-7B. The sample units inspected are shown on the Pavement Branch Plans in Appendix A.

5.4 Layout Methodology

Throughout this report, there are references to sections and sample units. The Sections of each Branch are labeled using an alpha-numeric descriptor. To better understand where on the Branch the references are made, the following descriptions and methods of determining sections and sample units were used.

The letter portion of the Section descriptor designates a section on the Taxiway or Apron (i.e. Section TW A-1 designates a section on Taxiway "A", and Section AP-1 designates a section on the Apron)

The numeric portion of the Section descriptor designates a particular Section of pavement which has been identified as distinctive, based on construction history, pavement section and/or use of pavement. Sections are numbered consecutively for each Branch. Pavements with the same use, but with differing construction history and pavement cross section are indicated by alpha-numeric descriptors, with the alpha descriptor before the hyphen indicating the use, and the number after the hyphen indicating areas within a section with differing construction history and pavement section, (i.e. Section AP-1 and AP-2 indicates the areas have the same use, but differ in construction history and pavement section).

In most cases, Sample Units are numbered from north to south or west to east. Sample Unit numbers are consecutive moving through the sections.

See Appendix A for the layout of the branches, sections and sample units.

After the selected sample units were inspected, PAVER™ ver. 7.0 software was used to calculate the Sample Unit PCI and the PCI for each Section.

6. RESULTS OF PAVEMENT CONDITION SURVEY

Appendix A contains Pavement Condition Plans illustrating the PCI associated with each Section, the number of Sample Units inspected for each Section, the total number of Sample Units in each Section and the PCI for each Sample Unit inspected. The PCI Reports showing the mean PCI for each Section are included in Table B-2 of Appendix B. The results of the field inspection for each Sample Unit showing distress types, severity levels and quantities, and Section PCI are included in Table B-3 of Appendix B. Field inspection photographs, are located in Appendix C. Photographs of typical pavement distresses are provided in Appendix D.

General information on each pavement Section is shown below. The tables highlight the area-weighted PCI of the section, the associated distress types and severities, and what the percent deducts are due to. It should be noted that it is typical of airports that primarily serve smaller aircraft to see the majority or all of the PCI deducts to be climate-related.

6.1 Taxiway G

A summary of the condition of Taxiway G is as follows:

Taxiway G Branch "TW G"					
Section	**2021 PCI**	**Percent Deducts Due To:**			**Distress Type (Severity)**
		Load	**Climate**	**Other**	
TW G-1	31	21	2	77	Alkali Silica Rxn (L,M) Joint Seal Damage (L) Joint Spall (L,M) Linear Cracking (L) Small Patch (L,M) Shrinkage Cracking (N/A)
TW G-2	89	0	0	100	Joint Spall (L) Corner Spall (L)
TW G-3	97	0	0	100	Small Patch (L)

6.2 Taxiway H

A summary of the condition of Taxiway H is as follows:

Taxiway H Branch "TW H"					
Section	**2021 PCI**	**Percent Deducts Due To:**			**Distress Type (Severity)**
		Load	**Climate**	**Other**	
TW H-1	95	0	35	65	Joint Seal Damage (L) Joint Spall (L) Corner Spall (L) Shrinkage Cracking (N/A)

6.3 Apron

A summary of the condition of the Apron is as follows:

Apron Branch "AP"					
Section	**2021 PCI**	**Percent Deducts Due To:**			**Distress Type (Severity)**
		Load	**Climate**	**Other**	
AP-1	96	0	0	100	Alkali Silica Rxn (L) Joint Spall (L) Scaling (L) Popouts (N/A)
AP-2	78	0	0	100	Alkali Silica Rxn (L) Joint Spall (M) Shrinkage Cracking (N/A)
AP-3	49	0	0	100	Alkali Silica Rxn (L) Joint Spall (L,M) Corner Spall (L,M) Small Patch (L,M) Large Patch (L) Shrinkage Cracking (N/A)
AP-4	54	46	3	51	Alkali Silica Rxn (L,M) Joint Seal Damage (L) Joint Spall (L) Corner Spall (L) Linear Cracking (L,M) Shrinkage Cracking (N/A)
AP-5	20	84	0	16	Alkali Silica Rxn (L) Joint Spall (L) Corner Spall (L) Linear Cracking (L) Shattered Slab (L,M) Shrinkage Cracking (N/A)

6.4 Tie-Down Apron

A summary of the condition of the Tie-Down Apron is as follows:

Tie-Down Apron Branch "ATD"					
Section	**2021 PCI**	**Percent Deducts Due To:**			**Distress Type (Severity)**
		Load	**Climate**	**Other**	
ATD-1	98	0	0	100	Joint Spall (M) Shrinkage Cracking (N/A)

6.5 Fuel Apron

A summary of the condition of the Fuel Apron is as follows:

Fuel Apron Branch "AFUEL"					
Section	2021 PCI	Percent Deducts Due To:			Distress Type (Severity)
		Load	Climate	Other	
AFUEL-1	65	53	0	47	Alkali Silica Rxn (L) Joint Spall (L) Corner Spall (L) Small Patch (M) Linear Cracking (L,M) Shrinkage Cracking (N/A)

6.6 Remain Overnight Apron

A summary of the condition of the Remain Overnight Apron is as follows:

Remain Overnight Apron Branch "RON"					
Section	2021 PCI	Percent Deducts Due To:			Distress Type (Severity)
		Load	Climate	Other	
RON-1	48	17	1	82	Alkali Silica Rxn (L,M) Joint Spall (L,M) Durability Cracking (L) Small Patch (L) Linear Cracking (L) Shrinkage Cracking (N/A)

7. ENGINEERING ANALYSES

Engineering analyses were performed using the PAVER™ software program to provide the information needed to develop a 10-year pavement rehabilitation plan and budget. The methodology used and results of the analyses are described below.

7.1 Taxiway PMP Customization

In order for a PMP to be a useful tool, it must reflect the policies, practices, and procedures of the agency using it. These factors must be taken into account during the analytical system development in order for the final product to reflect the decision process used by the agency. The PAVER™ software program was customized during this task to reflect the conditions and policies under which the March JPA operates. The customization involved the development of pavement performance models and the input of feasible repair types and unit costs. The repair types and unit costs were based upon information from previous projects.

7.2 Pavement Performance Models

Performance prediction models play an essential role in developing rehabilitation programs. The performance models are used within a pavement management system to predict pavement performance over time, thereby helping to determine the appropriate time to apply rehabilitation to a section so that the benefits obtained from the expenditure are maximized. In addition, by projecting the rate at which the pavement condition will change over time, a meaningful life cycle cost analysis can be performed to compare the costs of different rehabilitation alternatives.

PAVER™ software program uses the “family” approach to pavement condition prediction modeling. The family modeling approach involves organizing the pavement network into groups of pavements based on factors such as pavement type, climate, and traffic. For example, Portland Cement Concrete (PCC) pavements that have never received any maintenance and are subjected to heavy traffic may be grouped into a family. A constrained regression is then applied to the data set (pavement age versus current pavement condition index [PCI] value) to develop a deterioration curve for that family of pavements. The performance of an individual section can then be predicted by using a section’s relative position to the family curve that represents it.

The following factors were investigated during the development for the Civilian Aviation Area at March Inland Port

- surface type (Portland cement concrete [PCC])
- pavement use (taxiways and aprons)

Performance models were developed based on pavement surface type and use (i.e., taxiway vs. apron). These models should be updated whenever new pavement condition data is collected. Over time, as more data becomes available, it should be possible to further refine these models and to incorporate the consideration of other factors into their development.

7.3 Rehabilitation Analysis Process

Using the customized PAVER™ software program, a 10-year rehabilitation program was prepared for the Civilian Aviation Area at March Inland Port. The analysis was conducted considering a constrained budget, where the goal was to maintain minimum PCI levels, which were assigned as follows:

- Taxiways: PCI > 65
- Aprons: PCI > 65

Using PAVER™ software program an analysis was performed to identify and prioritize pavement rehabilitation needs for the Civilian Aviation Area at March Inland Port. The following process is used within PAVER™ to develop a pavement rehabilitation program:

1. PAVER™ calculates the PCI of all pavement sections for each analysis year by analyzing the last inspection data available and the pavement performance models developed for the pavement network.

2. PAVER™ compares each section's PCI in each analysis year with the "critical" PCI for that family of pavements. The critical PCI is the point at which pavement deterioration accelerates and preventive maintenance activities are no longer considered cost-effective. The critical PCI concept was developed by studying the results from the dynamic programming network optimization process and by performing life-cycle cost analyses on many projects nationwide. The critical PCI varies based on the type of pavement, pavement use, and other factors; generally, it is in the range of 50 to 70. During this project, a critical PCI of 65 was assigned to taxiways and aprons.

3. If an apron or taxiway pavement section in a given analysis year has a PCI between 46-65, the section was considered for resurfacing. If an apron or taxiway pavement section in a given analysis year has a PCI of 45 and below, the section was considered for reconstruction. If a pavement section PCI in a given analysis year is above these PCI values, it is assumed that no work will be done aside from typical maintenance i.e. global crack seal treatment every few years until the need for major rehabilitation.

4. The initial output from PAVER™ was modified to ensure that the final program is a reasonable blueprint for the airport to follow in the future. This process consisted of 1) manually making recommendations for resurfacing and reconstructing pavement sections and 2) grouping logical projects together into common program years. Each of these activities is discussed further below.

7.4 Cost Estimates

Cost estimates were developed for the 15-year rehabilitation program. Below is a detailed list of items to be included in these estimates.

7.4.1 Taxiway G-1

- Pavement Removal
- Portland Cement Concrete Pavement
- Bituminous Base Course
- Bituminous Tack Coat
- Aggregate Base Course
- Paint Striping (Yellow Reflectorized)
- Paint Striping (White Reflectorized)
- Paint Striping (Black Nonreflectorized)

7.4.2 Ron-1

- Pavement Removal
- Portland Cement Concrete Pavement
- Bituminous Base Course
- Bituminous Tack Coat
- Aggregate Base Course
- Paint Striping (Yellow Reflectorized)
- Paint Striping (White Reflectorized)
- Paint Striping (Black Nonreflectorized)

7.4.3 AP-5

- Routing & Crack Sealing

7.4.3 AFUEL-1

- Routing & Crack Sealing

The cost estimates were prepared in terms of 2022 dollars and utilizing daytime construction. Cost breakdowns for each of the recommended projects is located in Appendix E. In addition to the work described above, the cost estimates include a 20% contingency cost. Cost estimates do not include design, survey, mobilization, electrical, drainage, traffic control, SWPPP, unclassified excavation, construction administration or construction management.

8. AIRPORT CAPITAL IMPROVEMENT PLAN

A ten-year Airport Capital Improvement Plan (ACIP) project list has been prepared based on the results of the recommended 15-Year Rehabilitation Program derived by the field survey. The resulting 15-year ACIP and cost estimates are summarized in Table 8-1 (next page). The cost estimates for the projects include work typical of pavement maintenance and reconstruction projects.

Based on an analysis of the PCI reduction per year, it is recommended to implement stop-gap maintenance in the original recommended construction year, if the construction of any recommended project is delayed 3.5 years or more. The intent of the stop-gap activities is to address safety-related repairs on pavements which have a condition lower than the Critical PCI, and where there is insufficient funding to fully repair the section with major rehabilitation. Stop-gap maintenance does not extend the life of the pavement. A stop-gap maintenance policy usually consists of such actions as patching high-severity patches, depressions, blow-ups, and so on. In other words, pavement distresses that could pose safety hazards are corrected (at least temporarily).

These costs may be used for planning and budgeting purposes. The actual extent and duration of maintenance will depend upon pavement conditions as revealed by periodic inspections by the Airport Operations Staff.

TABLE 8-1 – ACIP PROJECTS

PRIORITY	DESIGN YEAR	PROJECT	CONSTRUCTION YEAR	COST*
1	2023	AP-5 Routing and Cracking	2023	County Maintenance Budget
2	2023	Phase 1 Taxiway G Reconstruction	2025	$1,784,820
3	2024	AFUEL-1 Routing and Cracking	2024	County Maintenance Budget
4	2024	Phase 2 Taxiway G Reconstruction	2026	$1,937,400
5	2025	Phase 3 Taxiway G Reconstruction	2027	$1,937,400
6	2026	Phase 4 Taxiway G Reconstruction	2028	$1,936,200
7	2027	Phase 5 Taxiway G Reconstruction	2029	$1,899,840
8	2028	Phase 6 RON-1 Reconstruction	2030	$1,803,600
9	2029	Phase 7 RON-1 Reconstruction	2031	$1,936,200
10	2030	Phase 8 RON-1 Reconstruction	2032	$1,915,620
11	2031	Phase 9 RON-1 Reconstruction	2033	$1,920,420
12	2032	Phase 10 RON-1 Reconstruction	2034	$1,920,420
13	2033	Phase 11 RON-1 Reconstruction	2035	$1,915,620
14	2034	Phase 12 RON-1 Reconstruction	2036	$1,910,820
15	2035	Phase 13 RON-1 Reconstruction	2037	$1,920,420
16	2036	Phase 14 RON-1 Reconstruction	2038	$1,916,820
17	2037	Phase 15 RON-1 Reconstruction	2039	$1,747,740
				TOTAL: $28,403,340

*Costs are based on total construction costs with a typical 20% contingency. Numbers are based on 2022 dollars from cost estimates located in Appendix E.

9. PAVEMENT MANAGEMENT REQUIREMENTS

This report fulfills the FAA requirements to establish a Pavement Maintenance Management System to inventory airside pavements, store construction and maintenance history, document current pavement conditions and to identify pavement maintenance and rehabilitation needs. Further, the FAA requires that airport sponsors maintain the Airport Pavement Management System by performing the following activities:

1. Record all substantial maintenance and rehabilitation work performed on airside pavements
2. Provide a convenient means for retrieval of the data recorded in step 1
3. Perform periodic pavement condition inspections every 3 years if the PCI method of pavement inspection is used, or;
4. Perform periodic pavement condition inspections every year if a “non-PCI” method of pavement inspection is used.

C&S has developed a set of forms for recording pavement maintenance activities. The forms, provided in Appendix G, should provide a convenient means for March JPA to record this data in such a way that it can be readily incorporated into any future PMP Report updates.

C&S recommends that March JPA continue to utilize the PCI method of pavement inspection because this method was used to develop this report. The PCI data should be loaded into the PMP and the ACIP and Maintenance and Repair Plan updated every 3 years. In addition, March JPA should continue its periodic overview inspections of pavement conditions and perform isolated repairs to keep the pavement in a serviceable condition.

10. LIMITATIONS

The results of the pavement management study should be used as a guide in planning, prioritizing and budgeting pavement maintenance and rehabilitation. It should not be used as an alternative to, nor replace, a detailed engineering evaluation of individual pavements scheduled for repair. It is essential that thorough engineering evaluations and investigations are completed to confirm the projects detailed in this report.

DRAFT

APPENDIX “A”

SECTION AND SAMPLE UNIT LAYOUT PLANS

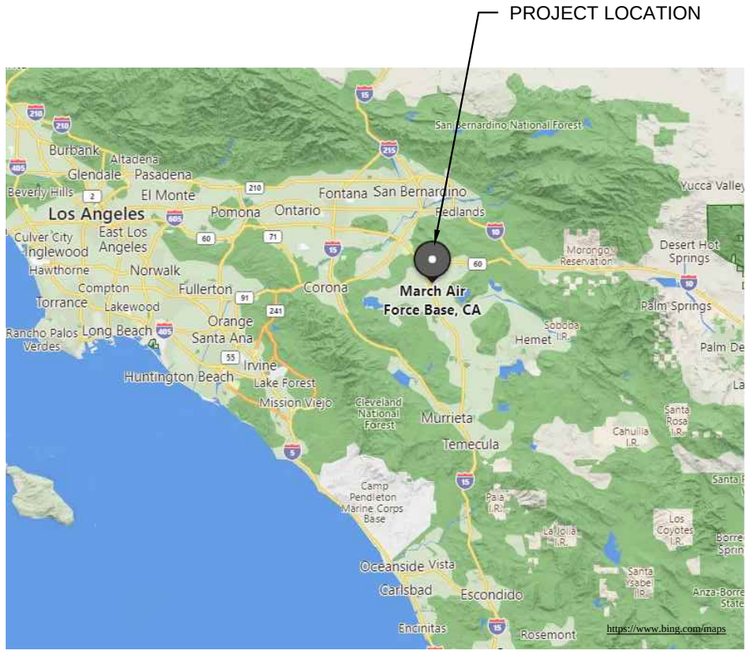
DRAFT

CONTRACT DRAWINGS
FOR THE INSPECTION OF

AIRPORT PAVEMENT MANAGEMENT PROGRAM

MARCH JOINT POWERS AUTHORITY

CIVILIAN AVIATION AREA
RIVERSIDE COUNTY, CALIFORNIA



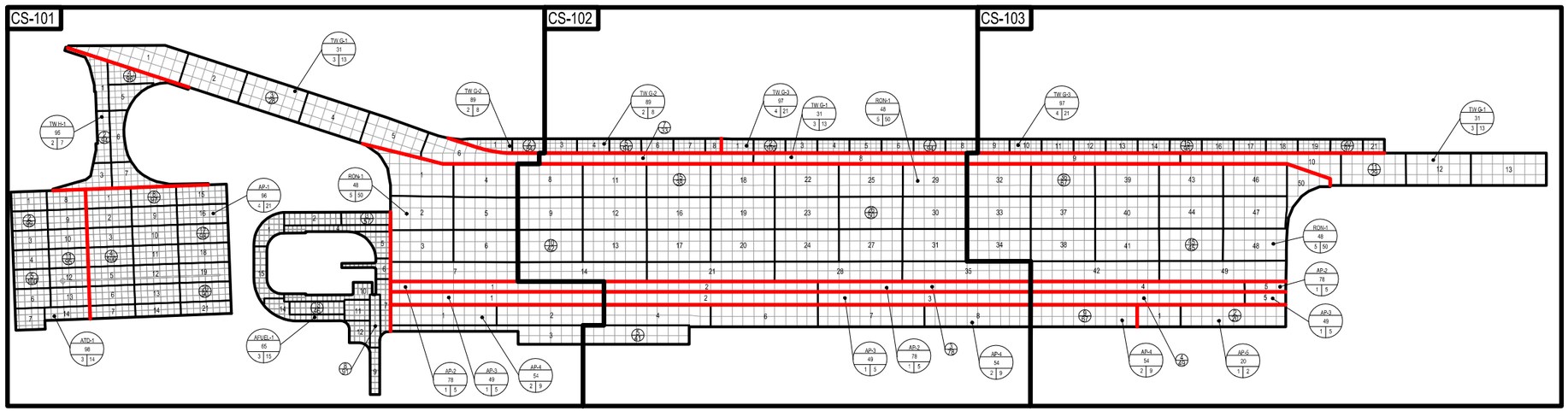
LOCATION MAP
NOT TO SCALE

SHEET NO.	SHEET REFERENCE NO.	TITLE
1.	G-001	TITLE SHEET
2.	CS-100	KEY PLAN
3.	CS-101	PCI INSPECTION SHEET 1
4.	CS-102	PCI INSPECTION SHEET 2
5.	CS-103	PCI INSPECTION SHEET 3

APRIL 2022

PROJECT FILE NO. H78.012.004
CADD FILE NO. H78_G-001_MARCH JPA

DRAFT



TW A-1
57
3 | 15

SECTION NUMBER

SECTION PCI (PAVEMENT CONDITION INDEX)

TOTAL NUMBER OF SAMPLE UNITS IN SECTION

NUMBER OF SAMPLE UNITS INSPECTED

8
53

INSPECTED SAMPLE UNIT NUMBER

INSPECTED SAMPLE UNIT PCI

300 0 300 600FT.
300'

A1 LEGEND
SCALE: NOT TO SCALE

A2 KEY PLAN
SCALE: 1" = 300'

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RIVERSIDE COUNTY, CALIFORNIA

MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	H78.012.004
DATE:	APRIL 2022
DRAWN BY:	CM
DESIGNED BY:	JC
CHECKED BY:	BS

KEY PLAN

CS-100

Apr 08, 2022 – 11:46am
P:\Projects\H78 – March Joint Powers Authority\H78012004 – PMP and PCI\Design\CADD\Sheet Files\H78.012.004_C–Series_March JPA.dwg

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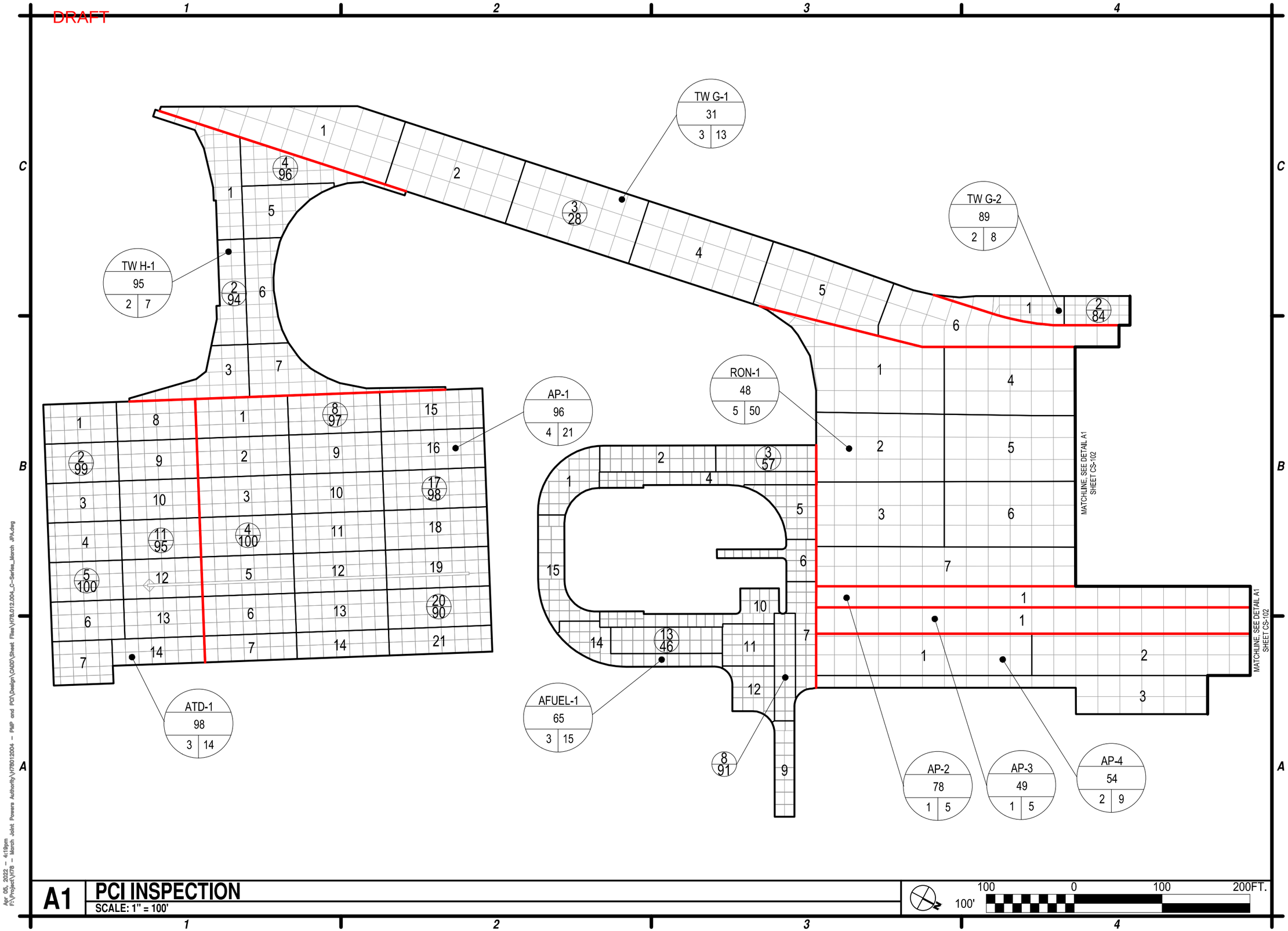

A1 PCI INSPECTION
SCALE: 1" = 100'

100' 100 0 100 200FT.

Apr 05, 2022 – 4:19pm
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PROJECT NO:	H78.012.004
DATE:	APRIL 2022
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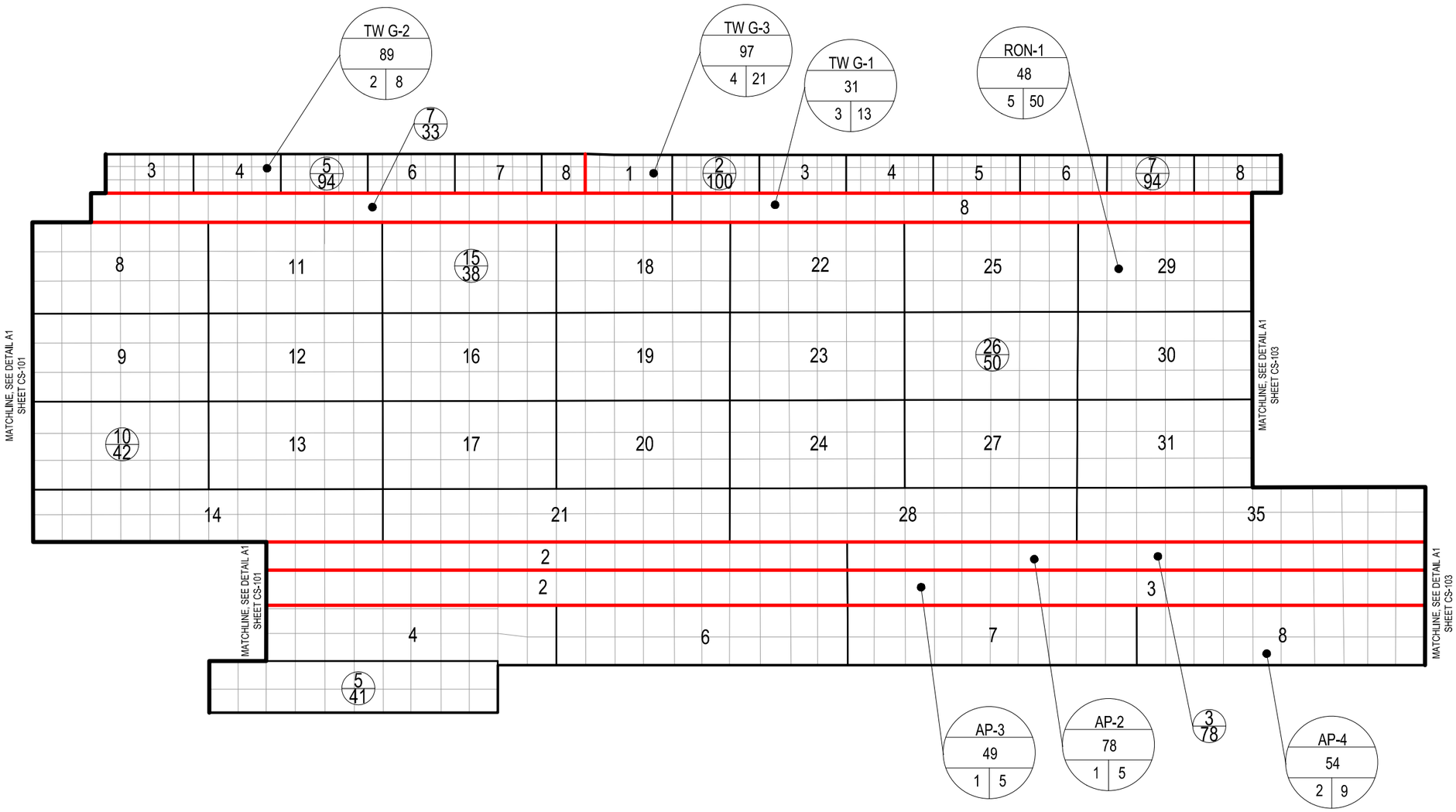
PCI INSPECTION SHEET 1

CS-101

DRAFT



A1 PCI INSPECTION
SCALE: 1" = 100'

100' 100 0 100 200FT.

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MARK	DATE	DESCRIPTION
REVISIONS		

PROJECT NO:	H78.012.004
DATE:	APRIL 2022
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CHECKED BY:	BS

PCI INSPECTION SHEET 2

CS-102

Apr 05, 2022 - 4:19pm
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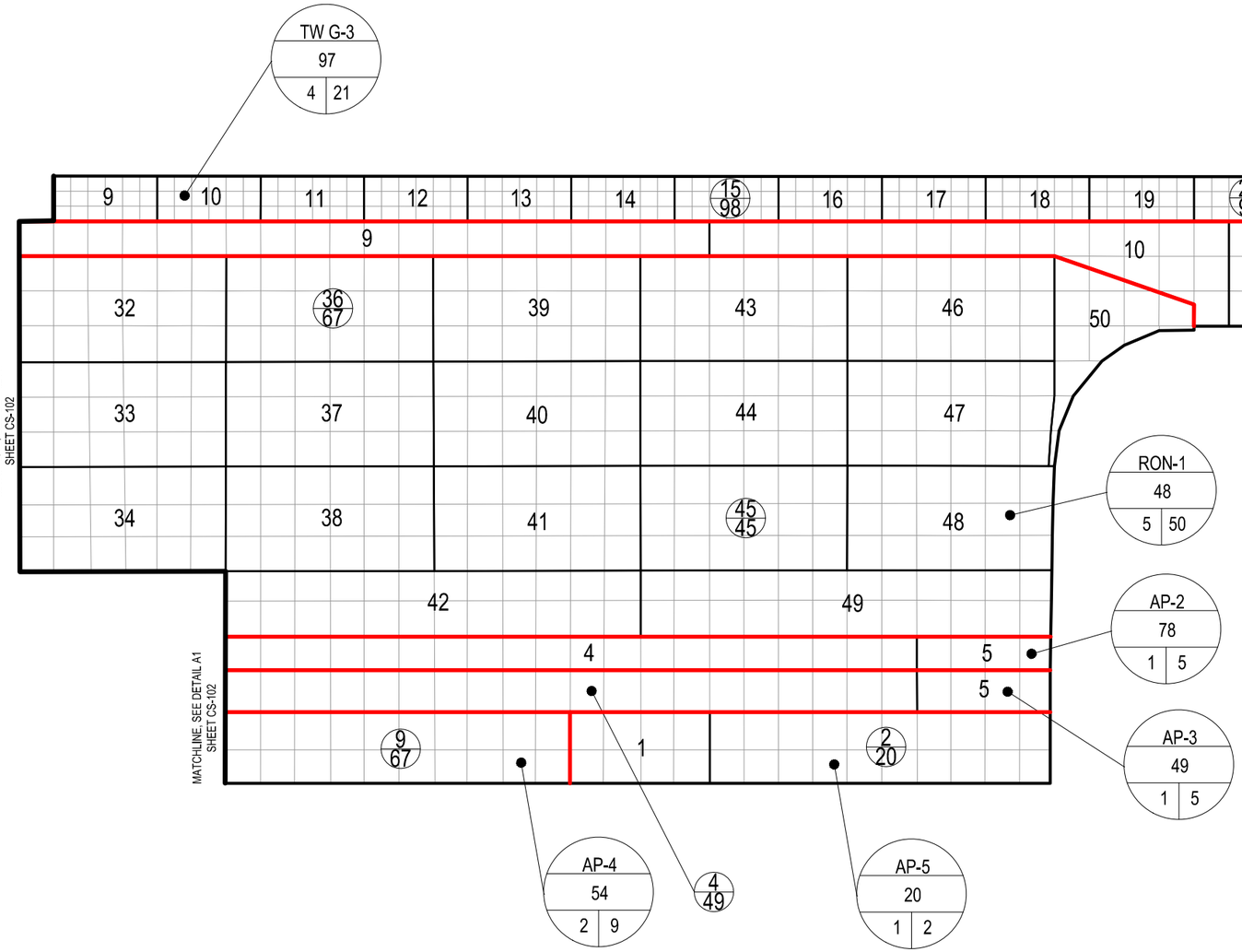

MATCHLINE, SEE DETAIL A1
SHEET CS-102

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A1 **PCI INSPECTION**
SCALE: 1" = 100'

100 0 100 200FT.
100'

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MARK	DATE	DESCRIPTION
		REVISIONS

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DATE:	APRIL 2022
DRAWN BY:	CM
DESIGNED BY:	JC
CHECKED BY:	BS

PCI INSPECTION
SHEET 3

CS-103

APPENDIX “B”

PCI REPORTS

DRAFT

Table B-1

Branch Listing Report

Branch ID	Section ID	True Area	Area Units	Total Units Sampled in Section
TW	TW G-1	151,142	SqFt	3
TW	TW G-2	19,083	SqFt	2
TW	TW G-3	49,718	SqFt	4
TW	TW H-1	30,933	SqFt	2
AP	AP-1	98,100	SqFt	4
AP	AP-2	49,748	SqFt	1
AP	AP-3	62,195	SqFt	1
AP	AP-4	107,330	SqFt	2
AP	AP-5	17,546	SqFt	1
ATD	ATD-1	53,260	SqFt	3
AFUEL	AFUEL-1	50,650	SqFt	3
RON	RON-1	574,145	SqFt	5

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Table B-2

PCI Report

Branch ID	Section ID	PCI
TW	TW G-1	31
TW	TW G-2	89
TW	TW G-3	97
TW	TW H-1	95
AP	AP-1	96
AP	AP-2	78
AP	AP-3	49
AP	AP-4	54
AP	AP-5	20
ATD	ATD-1	98
AFUEL	AFUEL-1	65
RON	RON-1	48

DRAFT

Table B-3

Inspection Report

Branch ID	Section ID	Sample Unit ID	Distress Description	Severity	PCI
TW	TW G-1	03	ASR	Low	28
TW	TW G-1	03	JOINT SEAL DAMAGE	Low	28
TW	TW G-1	03	ASR	Medium	28
TW	TW G-1	03	JOINT SPALLING	Low	28
TW	TW G-1	03	LINEAR CRACKING	Low	28
TW	TW G-1	03	SMALL PATCH	Medium	28
TW	TW G-1	07	ASR	Low	33
TW	TW G-1	07	ASR	Medium	33
TW	TW G-1	07	JOINT SPALLING	Low	33
TW	TW G-1	07	LINEAR CRACKING	Low	33
TW	TW G-1	07	SMALL PATCH	Low	33
TW	TW G-1	11	ASR	Low	29
TW	TW G-1	11	ASR	Medium	29
TW	TW G-1	11	JOINT SPALLING	Low	29
TW	TW G-1	11	JOINT SPALLING	Medium	29
TW	TW G-1	11	LINEAR CRACKING	Low	29
TW	TW G-1	11	SHRINKAGE CRACKING	N/A	29
TW	TW G-1	11	SMALL PATCH	Low	29
TW	TW G-2	02	CORNER SPALLING	Low	84
TW	TW G-2	02	JOINT SPALLING	Low	84
TW	TW G-2	05	JOINT SPALLING	Low	94
TW	TW G-3	02	NONE	N/A	100
TW	TW G-3	07	SMALL PATCH	Low	94
TW	TW G-3	15	SMALL PATCH	Low	98
TW	TW G-3	20	SMALL PATCH	Low	97
TW	TW H-1	02	CORNER SPALLING	Low	94
TW	TW H-1	02	SHRINKAGE CRACKING	N/A	94
TW	TW H-1	04	JOINT SEAL DAMAGE	Low	96
TW	TW H-1	04	JOINT SPALLING	Low	96
AP	AP-1	04	NONE	N/A	100
AP	AP-1	08	JOINT SPALLING	Low	97

Branch ID	Section ID	Sample Unit ID	Distress Description	Severity	PCI
AP	AP-1	08	SCALING	Low	97
AP	AP-1	17	SCALING	Low	98
AP	AP-1	20	ASR	Low	90
AP	AP-1	20	JOINT SPALLING	Low	90
AP	AP-1	20	POPOUTS	N/A	90
AP	AP-1	20	SCALING	Low	90
AP	AP-2	03	ASR	Low	78
AP	AP-2	03	JOINT SPALLING	Medium	78
AP	AP-2	03	SHRINKAGE CRACKING	N/A	78
AP	AP-3	04	ASR	Low	49
AP	AP-3	04	CORNER SPALLING	Low	49
AP	AP-3	04	CORNER SPALLING	Medium	49
AP	AP-3	04	JOINT SPALLING	Low	49
AP	AP-3	04	JOINT SPALLING	Medium	49
AP	AP-3	04	LARGE PATCH/UTILITY	Low	49
AP	AP-3	04	SHRINKAGE CRACKING	N/A	49
AP	AP-3	04	SMALL PATCH	Low	49
AP	AP-3	04	SMALL PATCH	Medium	49
AP	AP-4	05	ASR	Low	41
AP	AP-4	05	ASR	Medium	41
AP	AP-4	05	JOINT SPALLING	Low	41
AP	AP-4	05	LINEAR CRACKING	Low	41
AP	AP-4	05	LINEAR CRACKING	Medium	41
AP	AP-4	05	SHRINKAGE CRACKING	N/A	41
AP	AP-4	09	ASR	Low	67
AP	AP-4	09	CORNER SPALLING	Low	67
AP	AP-4	09	JOINT SEAL DAMAGE	Low	67
AP	AP-4	09	JOINT SPALLING	Low	67
AP	AP-4	09	SHRINKAGE CRACKING	N/A	67
AP	AP-5	02	ASR	Low	20
AP	AP-5	02	CORNER SPALLING	Low	20

Branch ID	Section ID	Sample Unit ID	Distress Description	Severity	PCI
AP	AP-5	02	JOINT SPALLING	Low	20
AP	AP-5	02	LINEAR CRACKING	Low	20
AP	AP-5	02	SHATTERED SLAB	Low	20
AP	AP-5	02	SHATTERED SLAB	Medium	20
AP	AP-5	02	SHRINKAGE CRACKING	N/A	20
ATD	ATD-1	02	SHRINKAGE CRACKING	N/A	99
ATD	ATD-1	05	NONE	N/A	100
ATD	ATD-1	11	JOINT SPALLING	Medium	95
ATD	ATD-1	11	SHRINKAGE CRACKING	N/A	95
AFUEL	AFUEL-1	03	ASR	Low	57
AFUEL	AFUEL-1	03	JOINT SPALLING	Low	57
AFUEL	AFUEL-1	03	LINEAR CRACKING	Low	57
AFUEL	AFUEL-1	03	LINEAR CRACKING	Medium	57
AFUEL	AFUEL-1	03	SHRINKAGE CRACKING	N/A	57
AFUEL	AFUEL-1	03	SMALL PATCH	Medium	57
AFUEL	AFUEL-1	08	ASR	Low	91
AFUEL	AFUEL-1	08	CORNER SPALLING	Low	91
AFUEL	AFUEL-1	08	JOINT SPALLING	Low	91
AFUEL	AFUEL-1	13	ASR	Low	46
AFUEL	AFUEL-1	13	CORNER SPALLING	Low	46
AFUEL	AFUEL-1	13	JOINT SPALLING	Low	46
AFUEL	AFUEL-1	13	LINEAR CRACKING	Low	46
AFUEL	AFUEL-1	13	LINEAR CRACKING	Medium	46
AFUEL	AFUEL-1	13	SHRINKAGE CRACKING	N/A	46
RON	RON-1	10	ASR	Low	42
RON	RON-1	10	ASR	Medium	42
RON	RON-1	10	JOINT SPALLING	Low	42
RON	RON-1	10	LINEAR CRACKING	Low	42
RON	RON-1	15	ASR	Low	38
RON	RON-1	15	ASR	Medium	38
RON	RON-1	15	JOINT SPALLING	Low	38

Branch ID	Section ID	Sample Unit ID	Distress Description	Severity	PCI
RON	RON-1	15	JOINT SPALLING	Medium	38
RON	RON-1	15	LINEAR CRACKING	Low	38
RON	RON-1	15	SMALL PATCH	Low	38
RON	RON-1	26	ASR	Low	50
RON	RON-1	26	ASR	Medium	50
RON	RON-1	26	SHRINKAGE CRACKING	N/A	50
RON	RON-1	36	ASR	Low	67
RON	RON-1	36	LINEAR CRACKING	Low	67
RON	RON-1	45	ASR	Low	45
RON	RON-1	45	ASR	Medium	45
RON	RON-1	45	DURABILITY CRACKING	Low	45
RON	RON-1	45	LINEAR CRACKING	Low	45
RON	RON-1	45	SMALL PATCH	Low	45

APPENDIX “C”

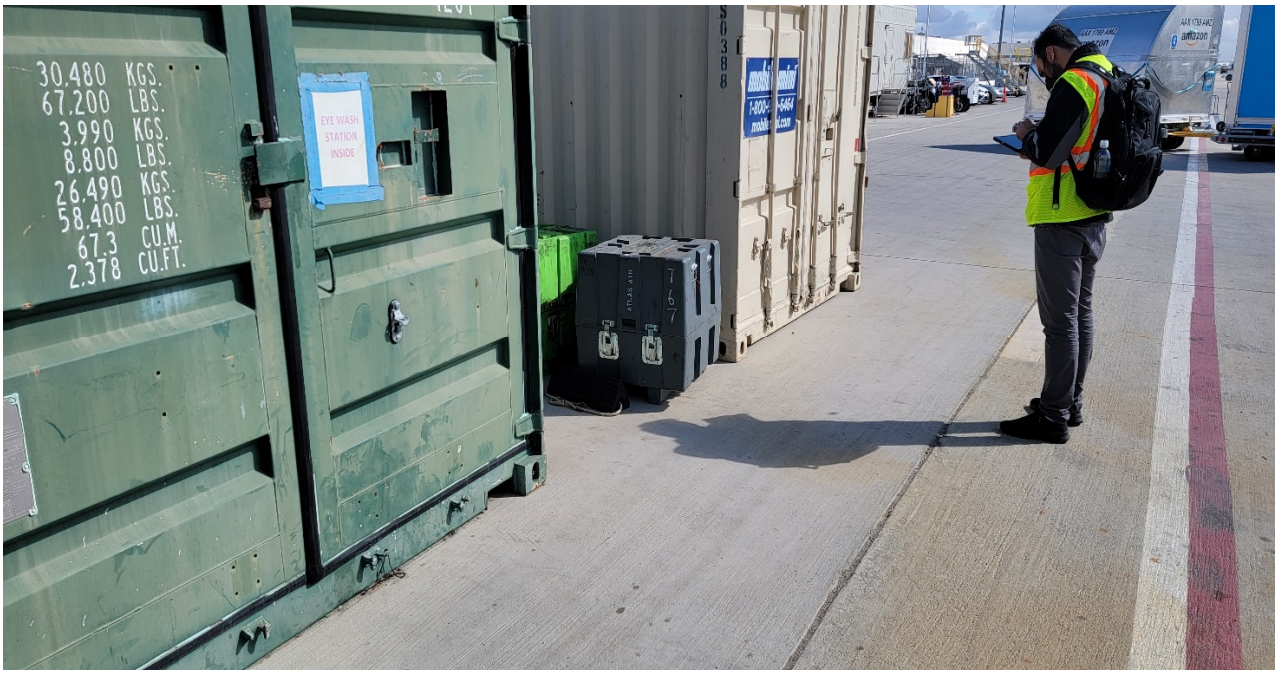
INSPECTION PHOTOGRAPHS


27


Prime Air


Prime Air


Prime Air


30,480 KGS.
67,200 LBS.
3,990 KGS.
8,800 LBS.
26,490 KGS.
58,400 LBS.
67.3 CU.M.
2,378 CU.FT.
EYE WASH STATION INSIDE


MILLION AIR


N421LM


Prime Air

APPENDIX “D”

TYPICAL DISTRESS PHOTOGRAPHS

Photo 1: Longitudinal/ Transverse Cracking (low severity)

Photo 2: Longitudinal/ Transverse Cracking (Medium)

Photo 3: Small Patch (low severity)

Photo 4: Small Patch (medium severity)

Photo 5: Shattered Slab (low severity)

Photo 6: Shattered Slab (medium severity)

Photo 7: Joint Seal Damage (medium severity)

Photo 9: Durability Cracking (low severity)

Photo 10: Alkali Silica Reactivity, ASR (low severity)

Photo 11: Alkali Silica Reactivity, ASR (medium severity)

Photo 12: Scaling (low severity)

Photo 13: Corner Spall (low severity)

Photo14: Joint Spall (low severity)

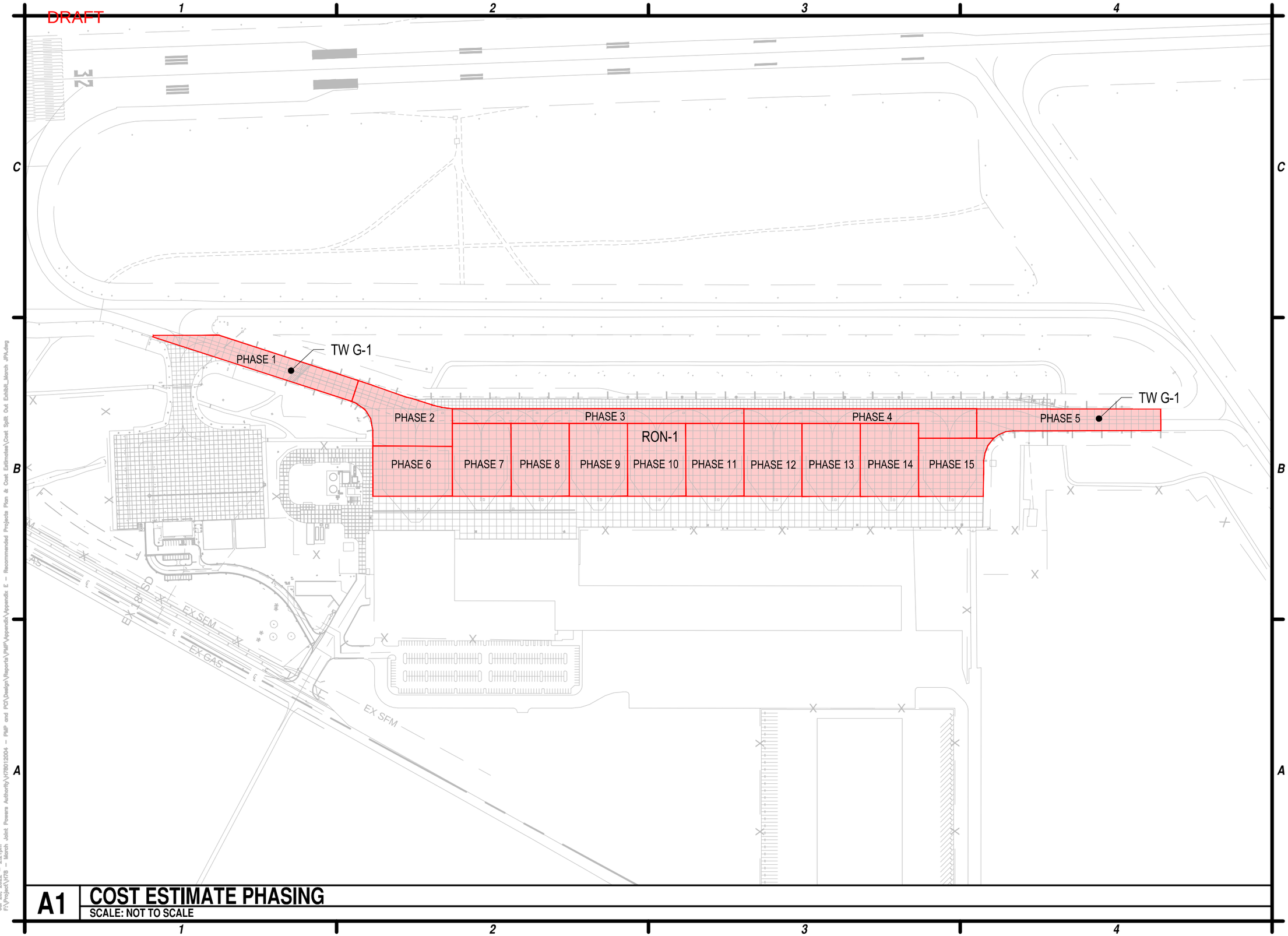
Photo 15: Joint Spall (medium severity)

DRAFT

APPENDIX “E”

COST ESTIMATES & PROJECT PLAN

DRAFT



A1 COST ESTIMATE PHASING
SCALE: NOT TO SCALE

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PROJECT NO:	H78.012.004
DATE:	APRIL 2022
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DESIGNED BY:	JC
CHECKED BY:	BS

COST ESTIMATE PHASING

FIGURE 1

Jul 20, 2022 – 2:21pm
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DRAFT

March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for Taxiway G-1 - PHASE 1

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,090	SY	$100	$509,000
Portland Cement Concrete Pavement (17")	P-501	2,410	CY	$300	$723,000
Bituminous Base Course (4")	P-403	1,190	TON	$150	$178,500
Bituminous Tack Coat	P-603	160	GAL	$10	$1,600
Aggregate Base Course (6")	P-208	850	CY	$65	$55,250
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$297,470

Project Cost
$1,784,820

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management

DRAFT

March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for Taxiway G-1 - PHASE 2

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,510	SY	$100	$551,000
Portland Cement Concrete Pavement (17")	P-501	2,600	CY	$300	$780,000
Bituminous Base Course (4")	P-403	1,280	TON	$150	$192,000
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	920	CY	$65	$59,800
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$322,900

Project Cost
$1,937,400

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

DRAFT

March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for Taxiway G-1 - PHASE 3

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,510	SY	$100	$551,000
Portland Cement Concrete Pavement (17")	P-501	2,600	CY	$300	$780,000
Bituminous Base Course (4")	P-403	1,280	TON	$150	$192,000
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	920	CY	$65	$59,800
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$322,900

Project Cost
$1,937,400

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

DRAFT

March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for Taxiway G-1 - PHASE 4

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,500	SY	$100	$550,000
Portland Cement Concrete Pavement (17")	P-501	2,600	CY	$300	$780,000
Bituminous Base Course (4")	P-403	1,280	TON	$150	$192,000
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	920	CY	$65	$59,800
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$322,700

Project Cost
$1,936,200

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for Taxiway G-1 - PHASE 5

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,390	SY	$100	$539,000
Portland Cement Concrete Pavement (17")	P-501	2,550	CY	$300	$765,000
Bituminous Base Course (4")	P-403	1,260	TON	$150	$189,000
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	900	CY	$65	$58,500
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$316,640

Project Cost
$1,899,840

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 6

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,110	SY	$100	$511,000
Portland Cement Concrete Pavement (17")	P-501	2,420	CY	$300	$726,000
Bituminous Base Course (4")	P-403	1,190	TON	$150	$178,500
Bituminous Tack Coat	P-603	160	GAL	$10	$1,600
Aggregate Base Course (6")	P-208	860	CY	$65	$55,900
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$300,600

Project Cost
$1,803,600

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 7

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,500	SY	$100	$550,000
Portland Cement Concrete Pavement (17")	P-501	2,600	CY	$300	$780,000
Bituminous Base Course (4")	P-403	1,280	TON	$150	$192,000
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	920	CY	$65	$59,800
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$322,700

Project Cost
$1,936,200

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 8

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,440	SY	$100	$544,000
Portland Cement Concrete Pavement (17")	P-501	2,570	CY	$300	$771,000
Bituminous Base Course (4")	P-403	1,270	TON	$150	$190,500
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	910	CY	$65	$59,150
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$319,270

Project Cost
$1,915,620

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 9

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,450	SY	$100	$545,000
Portland Cement Concrete Pavement (17")	P-501	2,580	CY	$300	$774,000
Bituminous Base Course (4")	P-403	1,270	TON	$150	$190,500
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	910	CY	$65	$59,150
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$320,070

Project Cost
$1,920,420

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 10

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,450	SY	$100	$545,000
Portland Cement Concrete Pavement (17")	P-501	2,580	CY	$300	$774,000
Bituminous Base Course (4")	P-403	1,270	TON	$150	$190,500
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	910	CY	$65	$59,150
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$320,070

Project Cost
$1,920,420

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 11

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,440	SY	$100	$544,000
Portland Cement Concrete Pavement (17")	P-501	2,570	CY	$300	$771,000
Bituminous Base Course (4")	P-403	1,270	TON	$150	$190,500
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	910	CY	$65	$59,150
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$319,270

Project Cost
$1,915,620

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 12

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,430	SY	$100	$543,000
Portland Cement Concrete Pavement (17")	P-501	2,560	CY	$300	$768,000
Bituminous Base Course (4")	P-403	1,270	TON	$150	$190,500
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	910	CY	$65	$59,150
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$318,470

Project Cost
$1,910,820

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 13

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,450	SY	$100	$545,000
Portland Cement Concrete Pavement (17")	P-501	2,580	CY	$300	$774,000
Bituminous Base Course (4")	P-403	1,270	TON	$150	$190,500
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	910	CY	$65	$59,150
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$320,070

Project Cost
$1,920,420

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 14

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	5,450	SY	$100	$545,000
Portland Cement Concrete Pavement (17")	P-501	2,570	CY	$300	$771,000
Bituminous Base Course (4")	P-403	1,270	TON	$150	$190,500
Bituminous Tack Coat	P-603	170	GAL	$10	$1,700
Aggregate Base Course (6")	P-208	910	CY	$65	$59,150
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$319,470

Project Cost
$1,916,820

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for RON-1 PHASE 15

Treatment	Specification	Quantity	Unit	Unit Price	Treatment Cost
Pavement Removal	P-101	4,950	SY	$100	$495,000
Portland Cement Concrete Pavement (17")	P-501	2,340	CY	$300	$702,000
Bituminous Base Course (4")	P-403	1,160	TON	$150	$174,000
Bituminous Tack Coat	P-603	150	GAL	$10	$1,500
Aggregate Base Course (6")	P-208	830	CY	$65	$53,950
Paint Striping (Yellow Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (White Reflectorized)	P-620	1	LS	$10,000	$10,000
Paint Striping (Black Nonreflectorized)	P-620	1	LS	$10,000	$10,000
Contingency (20%)					$291,290

Project Cost
$1,747,740

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2022 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for AP-5

Treatment	Specification	Unit	Quantity (LF)	Unit Price	Treatment Cost
Filling of Cracks 1/8" to 1/2" Wide	P-101	LF	3,000	$12	$36,000
Contingency (20%)					$7,200

Project Cost
$43,200

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2018 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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March Joint Powers Authority Owned Civilian Aviation Area Cost Estimate for AFUEL-1

Treatment	Specification	Unit	Quantity (LF)	Unit Price	Treatment Cost
Filling of Cracks 1/4" to 1/2" Wide	P-101	LF	2,000	$12	$24,000
Contingency (20%)					$4,800

Project Cost
$28,800

Notes & Assumptions

1. Pavement sections to be designed based on FAA specifications and geotechnical recommendations
2. Unit price based on 2018 dollars
3. 20% contingency
4. Design, survey, mobilization, electrical and drainage, traffic control, SWPPP, unclassified excavation, construction administration and construction management costs not included in this estimate

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APPENDIX “F”

10-YEAR PAVEMENT CONDITION FORECAST AND RECOMMENDATIONS (2020-2029)

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TABLE 1
March JPA
Pavement Projections - UNADJUSTED
(2022-2032) [1]

Branch ID	Section	Branch Use	Area (ft^2)	Pavement Type	Critical PCI	2022 PCI	% Deduct due to			Predicted PCI by Year									
							Load	Climate	Other	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
TW G	TW G-1	TAXIWAY	151,142	PCC	65	31	21	2	77	30	28	27	26	24	23	22	20	19	18
TW G	TW G-2	TAXIWAY	19,083	PCC	65	89	0	0	100	88	87	87	86	85	84	84	83	82	81
TW G	TW G-3	TAXIWAY	49,718	PCC	65	97	0	0	100	96	95	94	93	93	92	91	90	89	88
TW H	TW H-1	TAXIWAY	30,933	PCC	65	95	0	35	65	94	94	93	92	91	91	90	89	89	88
AP	AP-1	APRON	98,100	PCC	65	96	0	0	100	95	95	94	94	93	93	92	92	91	90
AP	AP-2	APRON	49,748	PCC	65	78	0	0	100	75	72	69	66	63	59	56	53	50	47
AP	AP-3	APRON	62,195	PCC	65	49	0	0	100	46	43	40	36	33	30	27	24	21	17
AP	AP-4	APRON	107,330	PCC	65	54	46	3	51	51	48	45	43	40	37	34	31	28	25
AP	AP-5	APRON	17,546	PCC	65	20	84	0	16	9	0	0	0	0	0	0	0	0	0
ATD	ATD-1	APRON	53,260	PCC	65	98	0	0	100	98	97	97	97	97	96	96	96	95	95
AFUEL	AFUEL-1	APRON	50,650	PCC	65	65	53	0	47	62	60	57	54	52	49	46	44	41	38
RON	RON-1	APRON	574,145	PCC	65	48	17	1	82	47	46	45	44	43	42	41	40	39	38

Total Area: 1,263,850 SF

58

2022 Weighted Average PCI - All Airield Pavement

44

Projected 2029 Weighted Average PCI - All Airield Pavement
(No Work Alternative)

APPENDIX “G”

PAVEMENT MAINTENANCE AND REHABILITATION RECORD FORMS

PAVEMENT MAINTENANCE AND REHABILITATION RECORD FORM

FACILITY	SECTION	LOCATION WITHIN SECTION	DATE	WORK PERFORMED
TW G	TW G-1			
TW G	TW G-2			
TW G	TW G-3			
TW H	TW H-1			

PAVEMENT MAINTENANCE AND REHABILITATION RECORD FORM

FACILITY	SECTION	LOCATION WITHIN SECTION	DATE	WORK PERFORMED
AP	AP-1			
AP	AP-2			
AP	AP-3			
AP	AP-4			

PAVEMENT MAINTENANCE AND REHABILITATION RECORD FORM

FACILITY	SECTION	LOCATION WITHIN SECTION	DATE	WORK PERFORMED
AP	AP-5			
ATD	ATD-1			
AFUEL	AFUEL-1			
RON	RON-1			