MESILLA VALLEY METROPOLITAN PLANNING ORGANIZATION

TRANSPORTATION ASSET AND SAFETY MANAGEMENT PLAN

AUGUST 2014

Prepared For:

Mesilla Valley
Metropolitan Planning Organization
700 N. Main St.
Las Cruces, NM 88001

Bohannan Huston

Engineering
Spatial Data
Advanced Technologies

TRANSPORTATION ASSET AND SAFETY MANAGEMENT PLAN

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PREPARED FOR

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MESILLA VALLEY METROPOLITAN PLANNING ORGANIZATION

RESOLUTION NO. 14-11

A RESOLUTION ADOPTING THE MESILLA VALLEY MPO TRANSPORTATION ASSET AND SAFETY MANAGEMENT PLAN.

The Mesilla Valley Metropolitan Planning Organization Policy Committee is informed that:

WHEREAS, the Mesilla Valley Metropolitan Planning Organization is the designated Metropolitan Planning Organization for the Las Cruces area as designated by the Governor of New Mexico in accordance with 23 U.S.C. 134(b); and

WHEREAS, the Mesilla Valley Metropolitan Planning Organization is responsible for the planning and financial reporting of all federal and/or state funded transportation related projects within the MPO's Urbanized Area; and

WHEREAS, two of the national goals established by Congress in Moving Ahead for Progress in the 21st Century (MAP-21) are Safety and Infrastructure Condition; and

WHEREAS, the Mesilla Valley Metropolitan Planning Organization Policy Committee adopted the 2010 Metropolitan Transportation Plan, known as Transport 2040 on June 9, 2010; and

WHEREAS, the creation of Management Plans was listed in Chapter 4 of Transport 2040 as a goal for Mesilla Valley MPO staff; and

WHEREAS, the creation of a transportation asset plan and a safety management plan were specifically called for in Transport 2040; and

WHEREAS, the Technical Advisory Committee recommended approval at its June 5, 2014 meeting; and

WHEREAS, the Policy Committee has determined that it is in the best interest of the MPO for the Resolution adopting the Transportation and Safety Management Plan (TASM Plan) be approved.

NOW, THEREFORE, be it resolved by the Policy Committee of the Mesilla Valley Metropolitan Planning Organization:

(I)

THAT the Mesilla Valley Metropolitan Planning Organization's Transportation Asset and Safety Management Plan as shown in Exhibit "A", attached hereto and made part of this resolution is hereby adopted.

(II)

THAT staff is directed to take appropriate and legal actions to implement this Resolution.

DONE and **APPROVED** this _7th_ day of _August_ , 2014.

APPROVED:

____
Chair

Motion By:	Councillor Sorg
Second By:	Mayor Barraza
VOTE:	
Chair Garrett	Yes
Vice Chair Bernal	Abs
Councillor Pedroza	Yes
Councillor Small	Abs
Councillor Sorg	Yes
Commissioner Hancock	Yes
Commissioner Duarte-Benavidez	Yes
Mayor Barraza	Yes
Trustee Flores	Abs
Mr. Doolittle	Yes

ATTEST:

____
Recording Secretary

APPROVED AS TO FORM:

____
City Attorney

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LIST OF ABBREVIATIONS

AADT	Annual Average Daily Traffic
AASHTO	Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AMLT	Asset Management Leadership Team
BLM	Bureau of Land Management
BPAC	Bicycle and Pedestrian Facilities Advisory Committee
CFR	Code of Federal Regulations
CLC	City of Las Cruces
CLC PMAR	The City of Las Cruces Pavement Management Analysis Report
CTSP	Comprehensive Transportation Safety Plan
DAC	Dona Ana County
FHWA	Federal Highway Administration
GASB 34	Governmental Accounting Standards Board Statement Number 34
HERS	Highway Economic Requirement System
HPMS	Highway Performance Monitoring System
HSIP	Highway Safety Improvement Program
IMS	Infrastructure Management Services
Laser RST	Laser Road Surface Tester
LOS	Level of Service
MAP-21	Moving Ahead of Progress in the 21st Century Act
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
NBI	National Bridge Inventory
NBIAS	National Bridge Investment Analysis System
NMDOT	New Mexico Department of Transportation
NMEFC	New Mexico Environmental Finance Center
NMSU	New Mexico State University
ODOT	Ohio Department of Transportation
PCI	Pavement Condition Index
SCRTD	South Central Regional Transit District
TAC	Technical Advisory Committee
TASM	Transportation Asset Safety Management
TOM	Town of Mesilla
TRB	Transportation Review Board
UCR	Uniform Crash Report
UNM DRG	University of New Mexico Division of Governmental Research

I. INTRODUCTION

The Mesilla Valley Metropolitan Planning Organization (MPO) is a multi-jurisdictional planning agency which provides comprehensive transportation planning services for Las Cruces, Town of Mesilla, and part of Doña Ana County. In 1982, it was created as the Las Cruces MPO per the United Stated Code of Federal Regulation requiring an MPO be formed when the population of an urbanized area reaches 50,000. In 2013, the name was changed to the Mesilla Valley MPO.

The Las Cruces metropolitan area is among the fastest growing in the State of New Mexico, and the second largest city in the State in terms of size and population. Based on the 2010 U.S. Census, the population in the Mesilla Valley Metropolitan Planning Area is approximately 157,440.

In June 2010, the MPO adopted the current Metropolitan Transportation Plan (MTP) - Transport 2040. Among the implementation strategies outlined in the MTP is the development of various management plans. This Transportation Asset and Safety Management Plan (TASM Plan) represents one of the management plans recommended by the MTP. It is designed as the first step in implementation of coordinated asset management for transportation infrastructure under the jurisdiction of the following agencies: New Mexico Department of Transportation (NMDOT), Doña Ana County (DAC), City of Las Cruces (CLC) and Town of Mesilla (TOM).

A. PURPOSE

The overall purpose of this TASM Plan is to develop strategies, projects and tasks for implementation of a management approach to regionalized decision making related to transportation system improvement, maintenance, and replacement. This plan has been developed under the framework of MAP-21, Moving Ahead of Progress in the 21st Century Act (P.L. 112-141). MAP-21 is a performance-based program; therefore, a broader purpose of this Plan is to develop a data collection and prioritization process that can be used to evaluate the performance of the region's transportation planning efforts as they align with the criteria used in MAP-21.

Asset management practices are currently being established at the State and Federal level as well. Implementation of this TASM Plan will need to ensure compliance with these State and Federal initiatives. As it stands, the current TASM Plan provides much flexibility at the agency and regional level, allowing for full alignment with any future guidelines or requirements established by the Federal Highway Administration (FHWA) and/or the NMDOT.

The purpose of the TASM Plan is to provide direction to the agencies which benefit from the planning support of the Mesilla Valley MPO. The action items recommended within the TASM Plan will need to be implemented by the jurisdictional agencies respectively.

B. SCOPE

The scope of the TASM Plan is to create a strategic approach to identify the optimal allocation of resources for the management, operation, preservation, and enhancement of the transportation system. The result is to use public dollars in the most productive method in order to meet the needs of the current and future customers.

Components of the TASM Plan include an overview of the value of transportation asset management, creation of objectives, recommended performance measures, and discussion on data collection including data gaps. The TASM Plan will result in recommended action items for each asset and for the overall transportation asset management planning process for the region. The initial assets identified as being included in the TASM Plan are as follows:

- Roads
- Curb and gutter
- Sidewalks
- Bridges
- Transit Stops
- Trails
- Drainage Infrastructure (added during planning process)

In addition, we recommend including the assets below, in order to fully integrate the safety component in the TASM Plan.

- Traffic Signals
- Lighting
- Barriers

The scope and components of the TASM Plan have benefited from ongoing coordination with and input from the Mesilla Valley MPO Policy Committee, Technical Advisory Committee (TAC), and the Bicycle and Pedestrian Facilities Advisory Committee (BPAC).

II. WHAT IS TRANSPORTATION ASSET MANAGEMENT?

Transportation asset management is a business approach to managing physical assets based on data about those assets. Transportation asset management provides a framework for decision making and has as one of its goals, optimizing the dollars spent on an asset by weighing the benefit of maintenance to prolong asset life versus replacement of that asset.

This TASM Plan includes a safety management component, which fully integrates safety information into the decision making process. The definition according to the American Association of State Highway and Transportation Officials' (AASHTO's) Subcommittee on Asset Management is:

"Transportation Asset Management is a strategic and systematic process of operating, maintaining, upgrading and expanding physical assets effectively throughout their lifecycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision-making based upon quality information and well-defined objectives."

As transportation asset management is initiated at the agency level, it responds to five primary questions. These are the questions that each agency needs to ask as they build their own internal transportation asset management process. The answer to these questions provides the substance of a transportation asset management plan and gives the decision makers the information they need to spend public dollars wisely. Within the TASM Plan, we have begun to collect the answers we received from each agency, building a framework for future efforts.

1. What is the current state of my assets?
2. What are my required levels of service and performance delivery?
3. Which assets are critical to sustained performance delivery?
4. What are my best investment strategies for operations, maintenance, replacements and improvement?
5. What is my best long-term funding strategy?

III. OBJECTIVES AND PERFORMANCE MEASURES

Transportation asset management plans offer strategies and action items in the development of a formal asset management process which prioritized expenditures for each agency. As with any planning effort, this is a live process that evolves as each stakeholder agency develops their own asset management approach. However, the planning process begins with a set of objectives which align with state and federal objectives for transportation asset management. Objectives for the TASM Plan were established with support from the Mesilla Valley MPO, and include:

- Compliance with MAP-21
- Better justification for infrastructure maintenance and replacement decisions
- Prioritization of expenditure of funds
- Establish the value of collaboration amongst agencies in data collection, data maintenance, use of data, and implementation of projects.

Included in this TASM Plan and summarized below, are recommendations for criteria to be analyzed in order to establish performance measures. The expected relationship to these criteria can and should be individual to each agency and each asset.

- Asset condition
- Asset capacity
- Safety
- Congestion

IV. ASSET INVENTORY AND CONDITIONS

A. INVENTORY

Data collection is one of the primary tasks in the development of a transportation asset management plan. As part of the TASM Plan, we have investigated the data currently available, by agency and asset, as well as the data structure. Through stakeholder meetings, and interviews we solicited additional input on how data is collected, maintained, and shared between agencies. With this information, we have created an overview of current data conditions and recommendations for future data collection, all included in the TASM Plan.

Research indicated that the City of Las Cruces, Doña Ana County, and the New Mexico State University (NMSU) roadway shapefiles overlap considerably. The City provides their roadway data to the County and the County manipulates that data to conform it to their schema. This data transfer is one way only. No information was received on the data transfer practices between the City and NMSU or the County and NMSU. The Town of Mesilla does not maintain any electronic data.

Table 1 displays a summary of data received from the stakeholder agencies for the assets identified for the TASM Plan. More detailed summaries of each data set are included in Appendix A.

Recommendation:

- ***Strive to collect the data identified in Table 1.***

Table 1 – Summary of Data Received

	City of Las Cruces					Doña Ana County				
	Inventory		Condition		Comments	Inventory		Condition		Comments
Asset	**Data exists?**	**Data received?**	**Data exists?**	**Data received?**		**Data exists?**	**Data received?**	**Data exists?**	**Data received?**	
Roads	yes	yes	yes	yes	Pavement Management system report received containing pavement condition info	yes	yes	yes	yes	Shapefile of roads slightly different from CLC roads
Trails	yes	yes	unknown	no		yes	yes	unknown	no	
Transit Stops	yes	yes	unknown	no		no	no	NA	NA	
Bridges	yes	yes	National Bridge Inventory data – both inventory and condition (sufficiency rating) assumed used for all agencies.							
Sidewalks	No	no	unknown	no		unknown	no	unknown	no	
Curb and Gutter	unknown	no	unknown	no		unknown	no	unknown	no	
Traffic Signals	yes	no	unknown	no	Data reported from survey	unknown	no	unknown	no	
Lighting	yes	no	unknown	no	Data reported from survey	unknown	no	unknown	no	
Barriers	unknown	no	unknown	no		unknown	no	unknown	no	

	NMDOT					Town of Mesilla				
	Inventory		Condition		Comments	Inventory		Condition		Comments
Asset	**Data exists?**	**Data received?**	**Data exists?**	**Data received?**		**Data exists?**	**Data received?**	**Data exists?**	**Data received?**	
Roads	yes	yes	yes	yes		yes	yes	yes	yes	Paper map of roads received.
Trails	NA	no	NA	NA		unknown	no	unknown	no	
Transit Stops	NA	yes	NA	NA		unknown	no	unknown	no	
Bridges										
Sidewalks	NA	no	unknown	no		unknown	no	unknown	no	
Curb and Gutter	unknown	no	unknown	no		unknown	no	unknown	no	
Traffic Signals	unknown	no	unknown	no		unknown	no	unknown	no	
Lighting	unknown	no	unknown	no		unknown	no	unknown	no	
Barriers	unknown	no	unknown	no		unknown	no	unknown	no	

B. DATA GAPS

The identification of data gaps provides actual action items for the agencies as they begin to engage in asset management. The TASM Plan helps identify these gaps and indicates the need to consistently collect the associated data.

One of the primary data gaps is the lack of data on sidewalks, curb and gutter, lighting, signs, and barriers. Through our planning process, we were unable to collect it or identify if it is being collected by any or all agencies.

Another data gap identified is the limitation of the GIS roadway data, as it is comprised of a centerline file. This convention does not allow the calculation of pavement surface area for replacement projects. In comparison, the CLC's Pavement Management System database includes a width for roadway segments (that are paved), and each segment has an associated width, so that pavement replacement can be calculated. Table 2 summarizes data gaps by asset category.

NMSU manages its own transportation system but given the proximity and connectivity of this system with that of the MPO region, it is critical to engage them in the transportation asset management process. NMSU can bring strong support for the data collection process. Other agencies which should also be engaged because they have input on the transportation system as well as an internal data collection process, are the Bureau of Land Management (BLM) and the South Central Regional Transit District (SCRTD). While they are not within the planning jurisdiction of the Mesilla Valley MPO, they are members of the MPO Transportation Advisory Committee (TAC). It is recommended that this connection be capitalized upon so that the TASM Plan implementation can be truly regional.

Recommendations:

- ***Address data gaps in Table 2.***
- ***Create new GIS features on existing data files, allow assignment of attributes to those asset files and also allow visual representation of locations where those assets exist***
- ***Engage NMSU, BLM, SCRTD in the implementation of the TASM Plan***

Table 2 – Data Gaps

Asset	Comments on Data Gaps
Roads	No maintenance information received. Condition information for agencies other than CLC not received. Road width, number of lanes not included in GIS information. Process for linking Pavement Control Index (PCI) and traffic model needs to be solidified for data accessibility.
Trails	No maintenance information received. No condition information received.
Transit Stops	No maintenance information received. No condition information received.
Bridges	National Bridge Inventory Sufficiency Rating assumed to reflect condition. Do local agencies have inspection responsibilities?
Sidewalks	No inventory or condition information received. Sidewalk could be associated with the roads shapefile as an attribute.
Curb and Gutter	No inventory of condition information received. Curb and gutter could be associated with the roads shapefile as an attribute, but segmentation of curb and gutter is an issue that would not be captured with this method.
Traffic Signals	No inventory or condition information received.
Lighting	No inventory or condition information received.
Barriers	No inventory or condition information received.

C. CONDITION

Assessing the condition of assets is critical to determining the expected remaining life for each asset. Condition information can often be collected through regular business activities done by an agency, such as during routine maintenance activities. Alternatively, a formal condition inspection program can be instituted, as the NMDOT does.

As it relates to the stakeholder agencies involved in the TASM Plan, condition information is available exclusively for pavement. The CLC and the NMDOT both have programs in place to regularly inspect, and record a condition score for pavements.

The establishment of a system for inspecting and recording the condition of all other asset types is needed. A summary of the CLC Pavement Management Study is included in this document as a model, and because the pavement condition information is a critical piece of the overall TASM Plan.

Recommendations:

- ***Establish a process to collect condition data for each asset. Utilize existing activities to make it efficient and cost effective.***

1. SUMMARY OF PAVEMENT MANAGEMENT ANALYSIS REPORT FOR CITY OF LAS CRUCES, NM

The City of Las Cruces Pavement Management Analysis Report (CLC PMAR) was completed by Infrastructure Management Services (IMS) in February 2012. The report is included, without the Appendices, in Appendix B.

This report contains general information on the principles of pavement management, and then provides the results and summary of field data collection conducted using a Laser Road Surface Tester (Laser RST). Field data was collected on every street in the City system.

The CLC has over 125 miles of major roadways (arterials and collectors) and 332 miles of residential roadways, encompassing over 85M square feet of asphalt and concrete surfacing. At a replacement cost of $1.1M per mile, the value of this infrastructure is $484M.

Without an adequate routine pavement maintenance program, streets require more frequent reconstruction, thereby costing millions of extra dollars.

The field data gathered including the following:

- Rutting
- Roughness Index

- Surface Distress Index
- Structural Index

This data was used to create a single score representing the overall condition of the pavement, expressed as a Pavement Condition Index (PCI).

PCI = 33% Roughness + 67% Surface Distress if no deflection data was collected, or

PCI = 25% Structure +25% Roughness +50% Surface Distress if deflection data was collected

Within the City's Lucity software, all streets receive a Structural Index score. For segments with no deflection testing, a default Structural Index was entered based on the distresses encountered. The default Structural Index was assigned a weight value of zero, meaning it was not used in the PCI calculation.

A general idea of what condition levels mean with respect to remaining life and typical rehabilitation actions is included in the following table.

Table 3 – PCI Index from Pavement Management Analysis Report

PCI Range	Description	Relative Remaining Life	Definition
85-100	Excellent	15 to 25 years	Like new – little to no maintenance required
70-85	Very Good	12-20 years	Routine maintenance such as patching, crack sealing
60-70	Good	10-15 years	Heavier surface treatments and think overlays
40-60	Fair Marginal	7 to 12 years	Progressively thicker overlays
25-40	Poor	5 to 10 years	Very thick overlays or surface replacement, base reconstruction
0-25	Very Poor	0 to 5 years	High percentage of full reconstruction

The average overall pavement condition of the Las Cruces roadway network at the time of the survey was 63, and at the time of the report was 62.5. The report states that this is about the average of agencies surveyed by IMS. The pavement condition reflects a moderately aged network that has had recent growth along with roadway renewal. Sixteen

percent (16%) is in excellent condition with a PCI score greater than 85.
Twenty three percent (23%) is classified as very good, benefiting from preventative maintenance. If left untreated, these roads will drop in quality to become heavy surface treatment or overlay candidates. Seventeen percent (17%) of the streets are rated as good, 26% as fair or marginal, and 18% as poor or very poor, meaning they have failed or are past their optimal due point for rehabilitation or reconstruction.

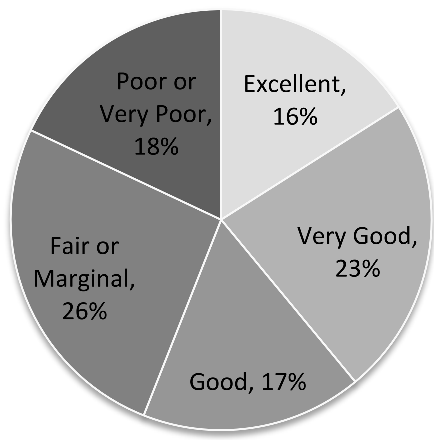


Figure 1 – Pavement Condition for CLC

The distribution of pavement conditions was examined for asphalt and concrete pavement. The asphalt roadways were found to have a wider range of condition scores with a lower PCI average of 63, while the concrete roads tend to fall in the very good rating with an average PCI score of 79.

Reconstruction backlog is 17% (based on the overall PCI of 63). Generally a backlog of 10% to 15% of the overall network is considered manageable. It is important that this value not be allowed to increase.

The report summarized rehabilitation strategies and unit rates. Those strategies include slurry seal, surface treatment, overlays of various thicknesses, locates repairs, partial and full reconstruction.

The report estimates a Fix All cost of $110M. Based on typical life cycles for each rehab, a steady state annual budget of $5.85M is estimated.

In conclusion, this type of analysis is needed for pavement condition. A similar type of analysis is recommended for every asset, with various levels of detail depending on the asset.

D. DEFINING PERFORMANCE AND IDENTIFYING PERFORMANCE GAPS

Performance many times is independent of condition, and must be evaluated in addition to condition analysis. It is important that performance measures be developed for each asset type so that performance can be regularly assessed and compared to the desired level of service for each asset type.

The following questions are provided as guidance for development/implementing performance measures for assets.

Questions to be answered regarding performance measures:

1. How will each performance measure be used?
2. Do targets for performance measures already exist? If so, are they realistic?
3. How does public input/comment get incorporated into the asset management process?
4. What is the planning horizon for meeting the performance measures identified in the TASM Plan?

Examples of performance measures are given in the Life Cycle Analysis section of the TASM Plan. These examples were based on coordination with the Mesilla Valley MPO Policy Board, the TAC, and the BPAC. However, it is important to remember that these are just examples and further refinement will need to be completed for each asset by each agency.

Recommendation:

- ***Each agency should establish clear and reasonable performance measures for each asset***

V. LEVELS OF SERVICE – DEFINED

A fundamental component of transportation asset management is the description of Levels of Service (LOS) for each asset type or system. Levels of service are classifications or standards that describe the quality of service offered to road users. They are based on the mission and goals of each agency.

Customer levels of service relate to how the customer receives the service in terms of tangible and intangible measure or criteria. They are expressed in terms that customers can understand and comprehend. Tangibles include the appearance of facilities, frequency of service disruptions, availability of service, frequency of crashes, etc. Intangibles include items such as speed of service, staff attitude, and ease of dealing with the agency.

Technical levels of service support both the customer levels of service and the agency's strategic objectives for each asset.

The AASHTO Transportation Asset Management Guide provides a discussion on Levels of Service, including examples of well and poorly defined levels of service, which are summarized below:

Example 1: Sidewalks

Poor Level of Service Statement: (too vague)

80% of users will be satisfied with our sidewalks.

Better Level of Service Statement:

Sidewalks will be provided on both sides of the road.

Wheelchair access at all crosswalks will be provided by 2015.

Sidewalks will be smooth, free of tripping hazards and 5 feet wide.

Example 2: Bridges

Poor Level of Service Statement: (too vague)

Bridges shall be strong enough and wide enough to carry the traffic using them.

Better Level of Service Statement:

All load posted bridges on roads carrying more than 10,000 ADT or on identified truck routes will be strengthened to AASHTO standards by 2020.

It is important to distinguish between the **condition** and **performance** of an asset.

- An asset's performance is directly related to its ability to provide the required level of service, and
- Its condition is an indication of its physical state, which may or may not affect its performance.

The TASM Plan includes examples for level of service statements for various assets. Some of these examples are relative statements with the actual percentage or quantifiable measurement to be determined by each agency individually.

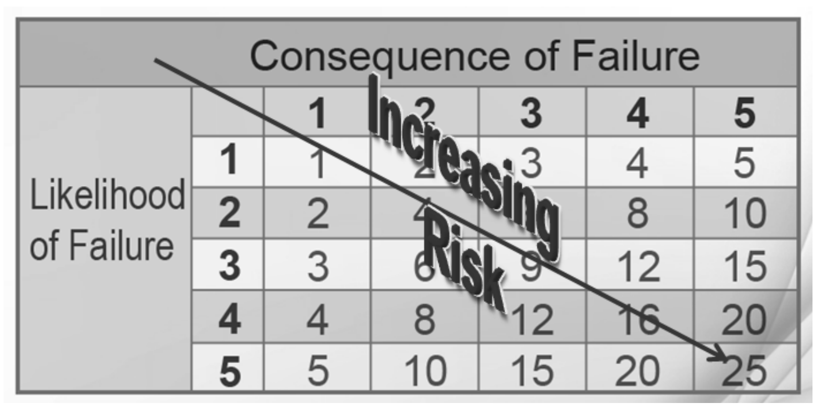
Recommendation:

- ***Individual agencies should refine level of service statements for each asset***

VI. ASSET RISKS AND WAYS TO MANAGE RISKS

The practice of asset management is based on assessing and managing risk. Risk, or "criticality", is a factor of the likelihood of failure of an asset and the consequence of failure of an asset. For a roadway, the likelihood of failure is influenced by the condition of the roadway, which in turn may be related to the age of the asset and the level of use. The consequence of failure of a roadway will vary depending on factors such as the number of users and the facilities to which the road provides access.

As an example, the criticality of a high traffic roadway that provides access to a school is higher than that of a low traffic roadway that provides access to a small number of residences. The following graphic shows the relationship between the likelihood and consequence of failure and risk.



		Consequence of Failure				
		1	2	3	4	5
Likelihood of Failure	1	1	2	3	4	5
	2	2	4	[illegible]	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5	10	15	20	25

Figure 2 – Risk Matrix

Factors that can be used to derive the likelihood of failure include:

- Asset age
- Asset condition
- Failure history
- Material

Factors that affect determination of the consequence of failure include:

- Cost of repair
- Social costs related to the loss of the asset
- Repair/replacement costs related to collateral damage caused by the failure
- Legal and environmental costs related to damage caused by the failure

The risk matrix assigns a risk factor to each asset based on criteria that directly affects the condition of the asset. When several assets receive the same rating through the annual evaluation of conditions, the matrix, using these key factors and criteria, determines the best use of limited available resources. The set of criteria should be established by each agency for each asset, as it reflects local priorities.

Recommendation:

- ***Define criteria for risk assessment for each asset***
- ***Prioritize asset improvement by criticality***

VII. LIFECYCLE MANAGEMENT

A. LIFECYCLE COSTS ANALYSIS

1. VALUATION OF ASSETS

Life Cycle Cost Analysis refers to the process for evaluating the total economic worth of infrastructure, including initial costs, and future costs such as maintenance, rehabilitation and reconstruction. Life cycle management is a sequence of events summarized in the list below:

- Establish Levels of Service
- Monitor Performance
- Identify Deficiencies
- Assess Risk
- Estimate Cost and Effect of Alternatives
- Evaluate and Select Action
- Group actions into projects
- Set priorities
- Match projects to programs

The Governmental Accounting Standards Board Statement No. 34 (GASB 34) provides for the reporting of asset values by either (1) depreciating asset value based on historical cost, or, (2) using the modified approach outlined in GASB 34 which applies asset management techniques.

However, there are several pitfalls with the first method. Most notably, historic costs are not always a good basis for future costs, for a number of reasons. The original installation cost of the asset may or may not relate to the replacement value, as the asset may be replaced with another type, material, or design. In addition, the theoretical design life of an asset is influenced by its service condition. We may estimate that pavements last 25 years, but some pavement last longer, and some fail earlier, depending on the service conditions, the quality of the installation, etc.

The second method, which requires an assessment of asset condition and the related remaining life, provides information that is more useful to asset managers and decision makers. Using asset management, the actual life of assets can be measured, and organizational measures can be derived, such as how well infrastructure stewardship has been performed.

To implement the second method, the replacement value of the asset must be known, as well as the remaining life. The replacement value can be calculated based on industry standards. The remaining life can be estimated on a conceptual level by the age of the asset. However, if possible, a condition inspection to verify the actual physical condition of assets should be used to estimate the remaining life of each asset.

2. RELATIONSHIP BETWEEN MAINTENANCE AND REPLACEMENT COSTS

The relationship between maintenance of assets, replacement cost, and value based on the remaining life of an asset is illustrated by the curve shown below. This illustration emphasizes that when maintenance extends the life of an asset, the cost of replacement is deferred.

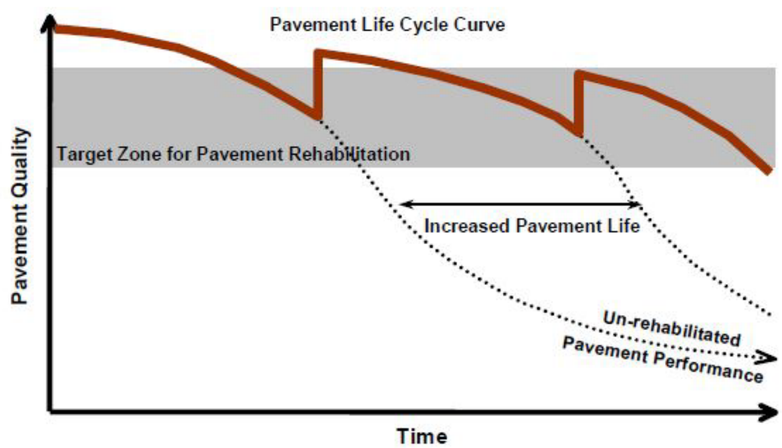


Figure 3 – Pavement Life Cycle Curve

B. LIFECYCLE MANAGEMENT IN THE TASM

The following Life Cycle Management sections of the TASM Plan contain information on each asset type including what is known about the inventory, sample level of service and performance measure statements, sample unit values for replacement, factors for assigning criticality, how to determine remaining life, and estimated life cycle costs. To supplement this analysis, a pilot project example was completed to compare asset management methodology along two separate roadways in Las Cruces.

With regards to the unit costs provided for asset replacement in the following Lifecycle Management sections, each agency should review historic asset maintenance and replacement costs to determine planning level unit costs for use in transportation asset management. In addition, the implementation of the TASM Plan will require development of a decision making process for deciding, for each asset type, if continued maintenance should be performed or replacement of an asset is warranted. It is important to remember that assets with low criticality may be run to failure.

Some questions that will help define the lifecycle management for each agency:

1. How will we address the relationship between routine maintenance and capital activities/funding?
2. How will we address the relationship between asset management activities and system expansion/funding?

Recommendations:

- ***Determine reasonable unit costs for replacement of each asset***
- ***Develop a decision-making process to compare costs associated with maintenance and replacement***

C. LIFE CYCLE MANAGEMENT – *PAVEMENT*

1. LEVEL OF SERVICE STATEMENTS AND PERFORMANCE MEASURES

The following level of service statements and associated performance measures are presented as starting points for this asset - *pavement*. They were established through communication with the agencies but are expected to be refined as the TASM Plan is further implemented. Many of the statements contain "XX" - this is to indicate the opportunity for each agency to include a quantifiable measurement which meets their goals and objectives for the associated asset.

Table 4 – LOS Statements for Pavement	**CLC**	**DAC**	**NMDOT**	**TOM**
Recommended LOS Statement(s)				
The average system-wide PCI will be at or above 62.	✓			
All Roads will be in "good" condition by year ***2020***		✓	✓	
All Roads will be in "good" condition by year ***2030***		✓		✓
Recommended Performance Measure				
PCI (determined through annual inspections program)	✓			
XX% of roads in "good" condition based on annual inspections and quantifiable comparisons		✓	✓	✓

a) *How to Achieve Level of Service Statements and Meet Performance Measures?*

The following are some strategies to help achieve these goals for this asset - *pavement*. They can and should be implemented by each agency individually.

1. Prioritize critical infrastructure.
    i. Some considerations for assigning criticality are category (arterial/collector/residential), traffic counts, and crashes.
2. Yearly pavement inspection program

3. Create and update a multi-year plan with schedule for pavement maintenance and replacement.

2. About the Existing Pavement System

Below is a summary of pavement assets by a mix of ownership and jurisdictional agency, with the agency-specific source identified Figure 4 displays a map of the roadways by ownership agency. This information is used to provide an overview of existing conditions. It is important to establish a baseline for comparison when initiating the asset management process. This will help in the establishment and achievement of the performance measures. Many of the roads do cross jurisdictional boundaries but with very few exceptions, the maintenance and capital improvement costs lie with the ownership agency.

Table 5 – City of Las Cruces – Pavement

Category	Miles
Major roadways (arterials and collectors)	**125**
Residential roadways	332
Total	**457**

Source: CLC PMAR

Table 6 – NMDOT – Pavement

Class	Miles
Highway	322
Interstate	218
State Road	56
Total	**596**

Source: DAC GIS data – based on "class"

Table 7 – Doña Ana County – Pavement

Surface	Miles
Graded	**641**
N/A (unknown)	9
Paved	**464**
Unpaved	1
Total	**1,116**

Source: DAC GIS data – based on surface type

Table 8 – Town of Mesilla – Pavement

Class	Miles
City	18.9
County	6.2
Highway	4.9
Private	2.5
Total	**32.8**

Source: DAC GIS data- based on location within Town of Mesilla

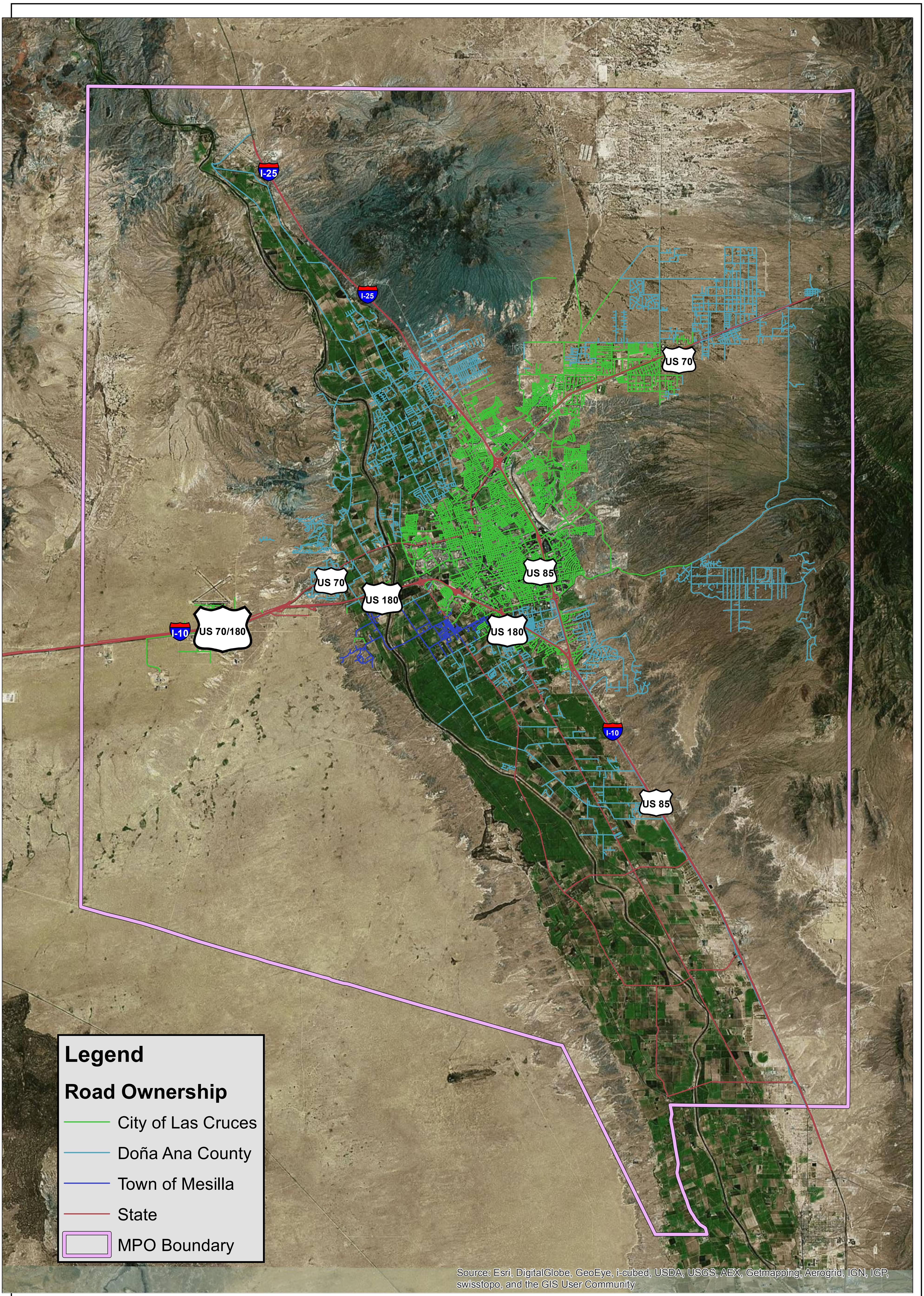


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FIGURE 4
ROADWAYS BY OWNERSHIP AGENCY

Mesilla Valley MPO Transportation Asset Safety Management Plan

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3. KEY ISSUES

Through the plan development process we have identified some key issues for pavement management which will need to be addressed by each agency as their individual asset management process develops. The level of detail will vary for each agency but consideration of these issues is recommended to ensure a comprehensive implementation of the TASM Plan.

Pavement at Lohman and Telshor

- *Backlog of roadways that need improvement:* For example, the backlog of roadways that require partial or total reconstruction for City of Las Cruces is approaching 20%. Generally a backlog of 10% to 15% of the overall network is considered manageable from a funding standpoint.
- *Maintenance budget vs. needs:* Determine the comparison between current maintenance budget funds available and an estimated amount of maintenance costs needed to improve the critical roadways.
- *Pavement surface:* Fully evaluate resurfacing treatments - different distresses require difference treatments (or combinations of treatments) to ensure roadway longevity and minimize overall costs.

4. STRATEGIES FOR MANAGING THESE ISSUES

In order to manage the issues above, the following questions will need to be answered by each agency. This will help in establishing and implementing a sustainable TASM Plan.

- Who is responsible for maintenance management within each agency?
- How is maintenance management tied to capital planning?
- How are budgets set for maintenance and capital projects?
- Have the maintenance needs in dollars been compared to the maintenance budget allocated?

5. REMAINING LIFE & LIFE CYCLE COST

Evaluation of the remaining life and the associated lifecycle costs are critical to a TASM Plan. The results are different for every asset, with the estimate remaining life for pavement identified as 25 years (CLC PMAR, 2012). As an example, the relationship between PCI ranges, remaining life, and condition were described in the following table excerpted from the CLC PMAR and provided below.

Table 9 – Life Cycle Cost Method for Pavement

Category	Miles	Replacement Cost ($/mile)	Asset Life	Remaining Life	% of Replacement Cost	100% Replacement	Value Based on Condition
City of Las Cruces							
Major roadways (arterial and collectors)	125	$ 1,000,000	25	15	60%	$ 125,000,000	$ 75,000,000
Residential roadways	332	$ 250,000	25	15	60%	$ 83,000,000	$ 49,800,000
				Totals	**60%**	**$ 208,000,000**	**$ 124,800,000**
Doña Ana County							
Graded/Unpaved Unknown	641	$ 50,000	5	2	40%	$ 32,050,000	$ 12,820,000
Paved	464	$ 250,000	25	15	60%	$ 116,000,000	$ 69,600,000
				Totals	**50%**	**$ 148,050,000**	**$ 82,420,000**
Town of Mesilla							
City Roads (assume paved)	19	$ 500,000	25	15	60%	$ 9,500,000	$ 5,700,000
				Totals	**60%**	**$ 9,500,000**	**$ 5,700,000**
NMDOT							
Highway	322	$ 1,200,000	25	20	80%	$ 386,400,000	$ 309,120,000
Interstate	218	$ 1,200,000	25	20	80%	$ 261,600,000	$ 209,280,000
State Road	56	$ 1,000,000	25	20	80%	$ 56,000,000	$ 44,800,000
				Totals	**80%**	**$ 704,000,000**	**$ 563,200,000**
					TOTAL MPO	**$1,069,550,000**	**$ 776,120,000**

The City of Las Cruces network valuation per the CLC PMAR was given as $484M, of which 32% represents pavements. The remaining amount represents subgrade and base, curb and gutter and drainage, sidewalks and ramps, signs and striping, landscaping, and miscellaneous. The pavement cost was estimated to represent over 85million square feet of asphalt and concrete surfacing. This cost, which incorporates the pavement condition, was based on $1M per mile, for all categories of roadway. In Table 9, we have distinguished the unit costs between arterial/collector and residential roadway pavements.

Using the estimated remaining life of the pavement, we can calculate a value that reflects the asset's actual service life. In this way, if preventive maintenance extends the life of the asset, the asset value is adjusted accordingly.

6. ASSET RISKS AND WAYS TO MANAGE RISK

The following values are recommended for an initial method of assessing criticality of roadways. In Table 10, the likelihood of failure of a pavement is related to the pavement condition index. In Table 11, two criteria are used to quantify the consequence of failure. These are examples that could be refined during implementation of the TASM Plan. Other criteria discussed by the stakeholders during the process of completing these projects were: land use (schools, fire stations, hospitals) and transit routes. For the purposes of illustration, Table 11 provides a scoring system that assigned 40% of the weight for consequence to Roadway Class, and 60% of the weight to the 2040 Annual Average Daily Traffic.

Table 10 – Likelihood of Failure Scoring – Pavement

Score	Likelihood of Failure	PCI	Age (Years)	Condition
1	Very Low	85-100	0 to 5	Excellent
2	Low	70-85	6 to 10	Very Good
3	Medium	60-70	11 to 15	Good
4	High	40-60	16 to 20	Fair
5	Very High	0-40	Over 20	Poor

Table 11 – Consequence of Failure Scoring – Pavement

Score	Consequence	*Class Weight*	Roadway Class	*Count Weight*	2040 AADT
1	Very Low	*.4*	Residential	*.6*	0 – 1,999
2	Low	*.4*	Local	*.6*	2,000-9,999
3	Medium	*.4*	Collector	*.6*	10,000-19,999
4	High	*.4*	Arterial	*.6*	20,000-34,000
5	Very High	*.4*	Highway/interstate	*.6*	>=35,000

7. HISTORIC EXPENDITURES AND REVENUE PLAN

The CLC PMAR provides an example of how the level of service statements and asset management practices can form the framework for a revenue plan. The CLC PMAR identified that an annual budget of $6M is required to maintain the PCI target of 62, while checking any increase in backlog and then over time, reducing backlog to below 15%. This emphasizes the need to coordinate the level of service statements and performance measures with the actual budget availability and the need to ensure that public and agency expectations can be met or exceeded.

Recommendations – Pavement:

- ***Refine pavement data to clearly indicate the miles of roadway pavement each agency is responsible for – for both maintenance and capital improvements.***
- ***Establish clear connection between maintenance/capital needs with maintenance/capital funds available***
- ***Evaluate optimal resurfacing treatments for cost and longevity***

VIII. COST COMPARISON FOR A CHIP SEAL MAINTENANCE PLAN

Based on actual data collected on the pavement condition and current/projected traffic volumes (including classifications) along an existing state highway in NMDOT District 1, a cost comparison graphic was created (Figure 5). The only delineating characteristics are whether the agency provides maintenance on a 3-year or 7-year basis. As indicated in the graphic, the cost savings of the 3-year maintenance plan are significant, with a total cost savings at the end of 21 years of $2,102,406.00. This example clearly indicates the need to connect maintenance plans with capital outlay plans. It also encourages the careful evaluation of when throughout the life time of each asset it is most beneficial to provide maintenance activities. The goal of the TASM Plan is to guide the agency in exactly this process.

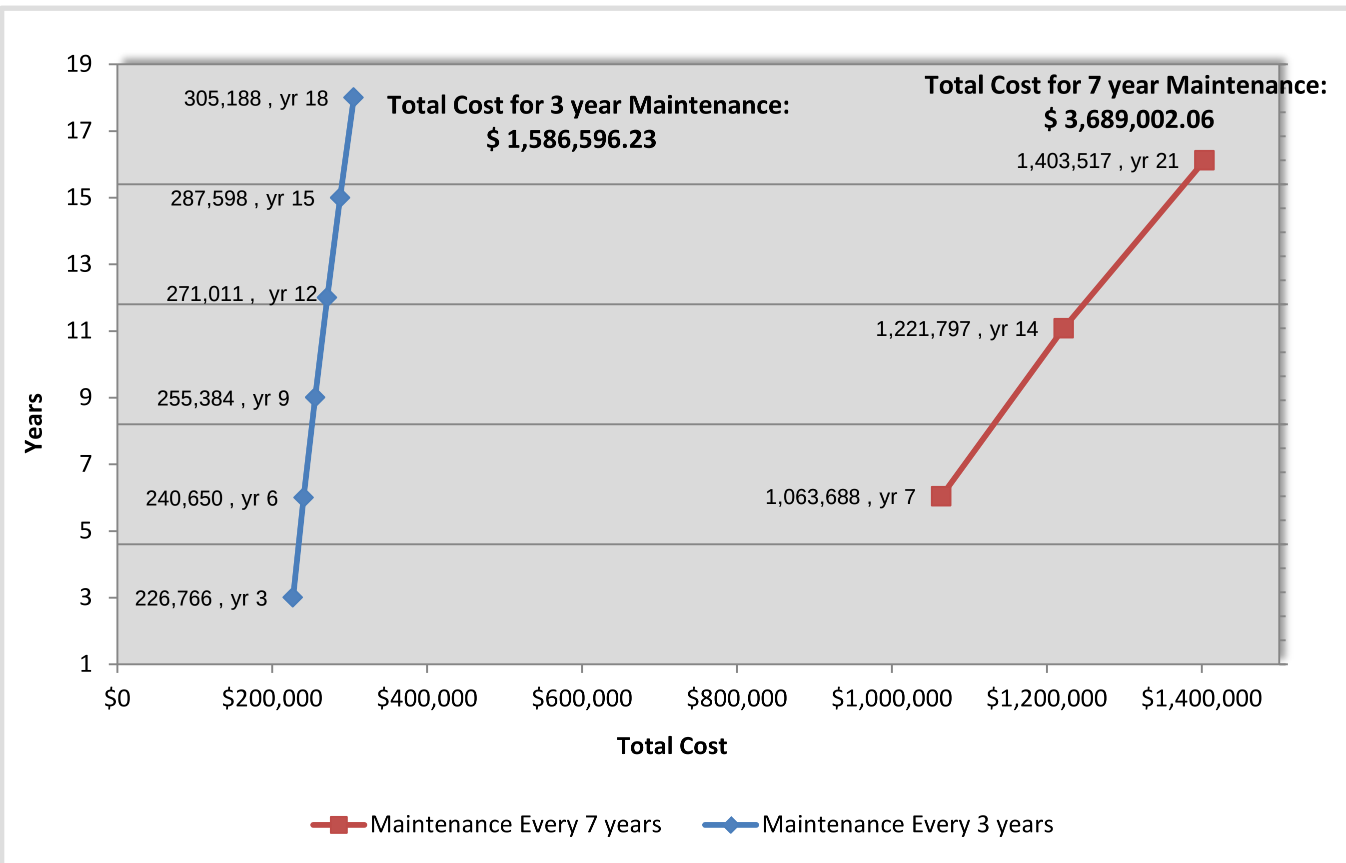

Figure 5 – Chip Seal Maintenance Plan Cost Estimate

A. LIFE CYCLE MANAGEMENT – *BRIDGES*

1. LEVEL OF SERVICE STATEMENTS AND PERFORMANCE MEASURES

The following level of service statements and associated performance measures are presented as starting points for this asset – *bridges*. For bridges, level of service statements and performance measures were established in conjunction with the National Bridge Inventory (NBI) evaluation methods adhered to by the FHWA and the NMDOT. There could be additional smaller bridge structures not included under the NBI; therefore, it will important for each agency to establish an evaluation process, level of service statement, and performance measure for these additional structures as part of the implementation of the TASM Plan. The "XX" - indicates the opportunity for each agency to include a quantifiable measurement which meets their goals and objectives for the associated asset.

Table 12 – LOS Statements for Bridges by Agency	CLC	DAC	NMDOT	TOM
Recommended LOS Statement(s) 100% of bridges at sufficiency rating above 55*	✓	✓	✓	✓
Recommended Performance Measure XX% of bridges at sufficiency rating above 55*	✓	✓	✓	✓

Bridges identified on the NBI

a) *How to Achieve Level of Service Statements and Meet Performance Measures?*

The NBI database contains detailed technical and engineering information about hundreds of thousands of bridges in the United States. The database includes inspection and condition data, year built, average daily truck traffic, future average daily traffic, bridge and roadway improvement estimated costs, the year targeted for improvements, and whether funding has been identified. The data dictionary for the NBI, which lists and describes the fields that are included in the NBI database, is included as Appendix C.

The Bridge Sufficiency Rating, cited above as the level of service measure, is a method from the NBI of evaluating highway bridge data by calculating four separate factors to obtain a numeric value which is indicative of bridge sufficiency to remain in service. The result of this method is a percentage in which 100 percent represents a bridge that is entirely sufficient and zero percent represents a bridge that is entirely insufficient (or deficient).

Sufficiency ratings are derived from factors derived from over 20 NBI data fields, including fields that describe structural evaluation, functional obsolescence, and essentiality to the public. A low Sufficiency Rating may be due to structural defects, narrow lanes, low vertical clearances, or any of many possible issues.

2. ABOUT BRIDGES WITHIN THE MPO REGION

From the 2013 National Bridge Inventory data set, there are 144 bridges identified within the MPO region. The number of bridges by jurisdictional agency (from the bridge data) within the MPO are summarized in Figure 9. The figure shows the bridges within the MPO, color-coded by Sufficiency Rating. It is understood that there are additional structures which are not identified on this list but will need to be added and evaluated under a similar process.

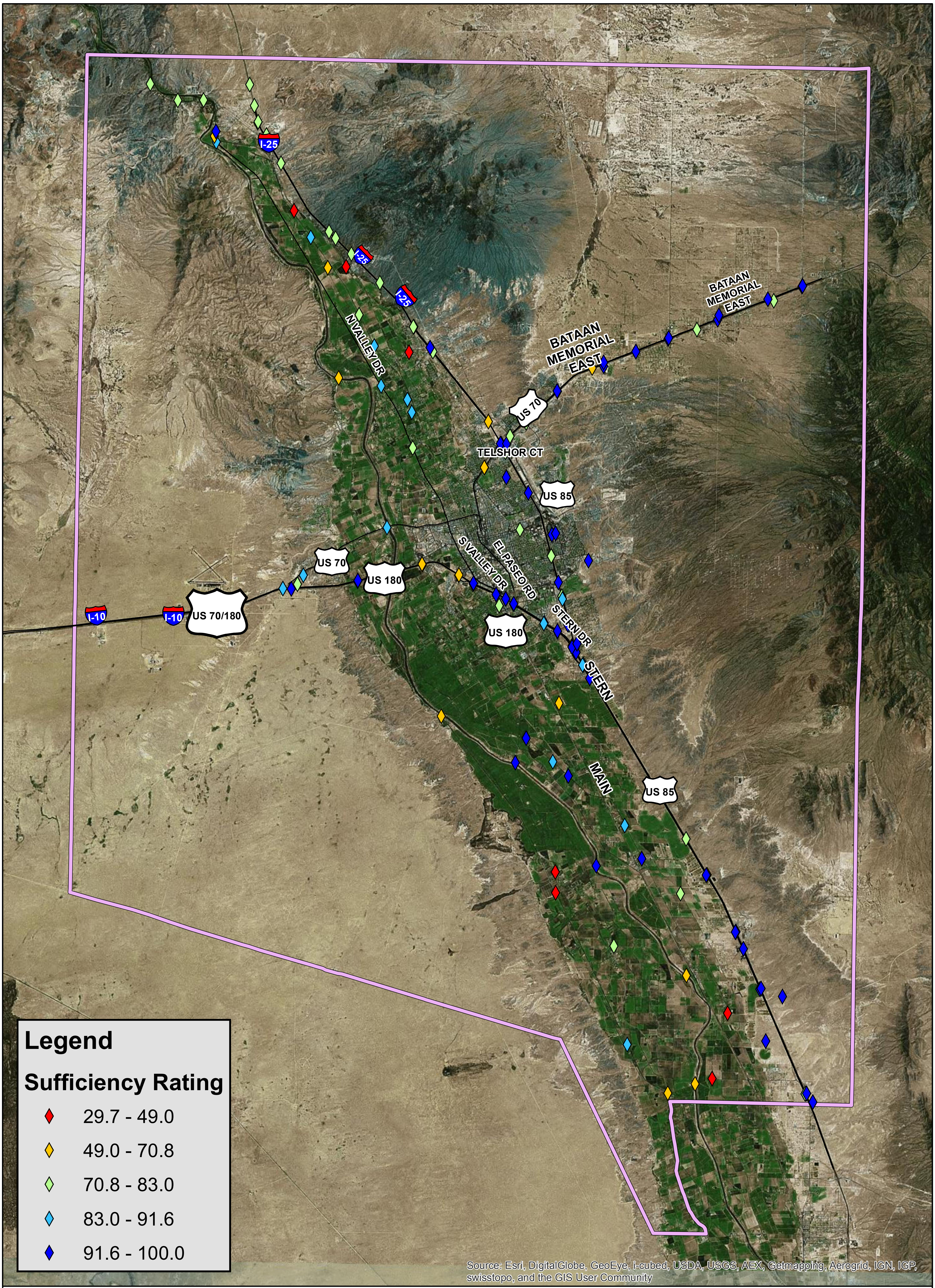

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FIGURE 6
BRIDGES WITH SUFFICIENCY RATING

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Table 13 – Summary of Bridges and Maintenance Responsibility

ITEM21 – Code	Maintenance Responsibility	Count
01	State Highway Agency	118
02	County Highway Agency	23
04	City of Municipal Highway Agency	2
11	State Park, Forest, or Reservation Agency	1

Source: NBI

3. KEY ISSUES

The key issue with managing to the level of service defined for bridges is ensuring that the structure inspections are done within the interval required, that maintenance is completed on a regular basis, and that the database accurately reflects that activity.

The NBI data includes a field showing the last date that the bridge was inspected, and another field showing the inspection interval in months. For the bridges within the MPO region, the oldest inspection date listed was in 2010. The inspection intervals vary from 6 months to 48 months.

There are a number of data gaps specifically in the cost and year of recommended projects. Of the 144 bridges, 38 are assigned a project cost and associated date in the database. The total cost of identified project improvements from the database for those 38 bridges is $23M.

Rio Grande Bridge

Sixteen of the 144 bridges show an improvement date of 2008, reflecting either a lag in updates to the database, or deferment of those projects. Of those 38, 3 have a sufficiency rating less than 55 and the total cost of improvements is $4.6M. The remaining dates are either 2020 or 2030.

4. STRATEGIES FOR MANAGING KEY ISSUES

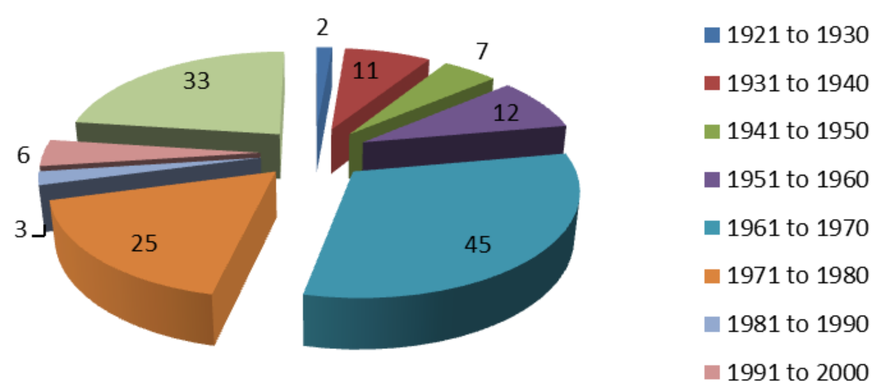
Bridge inspections need to be scheduled on an annual basis and be conducted at the interval identified for each structure. The agency needs to track the scheduled improvements, and whether the improvements are being completed in the time frame scheduled.

Addressing these data gaps, including identifying the cost of improvements to structures and associated roadways as well as scheduled dates for improvement, is critical to the implementation of the TASM Plan. In addition, an inspection and evaluation process needs to be put in place for the remaining structures which are not identified as part of the NBI.

5. REMAINING LIFE & LIFE CYCLE COST

For the purpose of asset management, the useful life of a bridge is considered to be 75 years. In Year 2013, based on age alone, bridges built in 1938 or before have reached the end of their useful life. The distribution of bridges by year built within the MPO region is shown below. From this summary, 13 were built before 1940.

Figure 7 – Mesilla Valley MPO Bridge Count by Year Built



The following table shows the application of asset management lifecycle cost techniques to the bridges within the MPO region. For this example, the same unit price is used for all bridges. The implementation of the TASM Plan should include developing unit costs for different types of bridges.

Table 14 – Life Cycle Cost Method for Bridges

Bridge Sufficiency Rating	Bridge Count	Replacement Cost	Asset Life (yrs.)	Remaining Life (yrs.)	% of Replacement Cost	100% Replacement	Value Based on Condition
86 to 100	77	$10M	75	75	100%	$ 770,000,000	$ 770,000,000
71 to 85	44	$10M	75	50	67%	$ 293,333,333	$ 195,555,556
56 to 70	15	$10M	75	30	40%	$150,000,000	$ 60,000,000
41 to 55	5	$10M	75	10	13%	$50,000,000	$ 6,666,667
0 to 40	3	$10M	75	0	0%	$200,000,000	$
					Totals	**$ 1,463,333,333**	**$1,032,222,222**

6. ASSET RISK AND WAYS TO MANAGE RISK

The following values are recommended for an initial method of assessing criticality of bridges. In Table 15, the likelihood of failure of a bridge is related to the Sufficiency Rating. In Table 16, two criteria are used to quantify the consequence of failure: functional classification of inventory route and Future Average Daily Traffic. These are examples that could be refined as the TASM Plan is implemented. For example, it may be desirable to consider Average Daily Truck Traffic (Item 109) as a criterion. For the purposes of illustration, and similar to that for pavement, Table 16 provides a scoring system that assigned 40% of the weight for consequence to Functional Class, and 60% of the weight to the Future Average Daily Traffic.

Table 15 – Likelihood of Failure – Bridges

Score	Likelihood of Failure	Sufficiency Rating
1	Very Low	85-100
2	Low	70-85
3	Medium	60-70
4	High	40-60
5	Very High	0-40

Table 16 – Consequence of Failure Scoring – Bridges

Score	Consequence	*Class Weight*	Functional Class	*Count Weight*	Future AADT
1	Very Low	*.4*	Rural and Urban Local	*.6*	0 – 1,999
2	Low	*.4*	Rural Minor Collector, Urban Collector	*.6*	2,000-9,999
3	Medium	*.4*	Rural Major Collector, Urban Minor Arterial	*.6*	10,000-19,999
4	High	*.4*	Rural Principal Arterial – Other & Other Principal Arterial; Urban Other Principal Arterial	*.6*	20,000-34,000
5	Very High	*.4*	Rural Principal Arterial-Interstate,; Urban Principal Arterial – Other Freeways or Expressways	*.6*	>=35,000

Benchmark: Georgia has a Bridge Prioritization Ranking formula which is based on two principles: structural capacity and user demands. Structural capacity is based on the strength of the structure to carry vehicle loads, the condition of the three different components of the bridge, and the type of structure. User demand considers the amount of traffic crossing the bridge, the length of the detour if the bridge is not in service, restrictions on truck weight and classification of the roadway.

7. HISTORIC EXPENDITURES AND REVENUE PLAN - *BRIDGES*

The NBI database provides an example of how the level of service statements and asset management practices can form the framework for a revenue plan. The NBI database for bridges in the MPO region identifies $23 million of improvements to be constructed by 2030. If this database were populated completely, and updated regularly, it could be used as the basis for budget planning for both maintenance and replacement activities for all agencies.

Recommendations – Bridges:

- ***Establish and adhere to inspection schedule for bridges – both on NBI and not on NBI***
- ***Develop level of service and performance measures for those structures not on the NBI***
- ***Develop unit costs for various bridge types***

B. LIFE CYCLE MANAGEMENT – *CURB AND GUTTER*

1. LEVEL OF SERVICE STATEMENTS AND PERFORMANCE MEASURES

The following level of service statements and associated performance measures are presented as starting points for this asset – *curb and gutter*. They were established through communication with the agencies but are expected to be refined as the TASM Plan is further implemented. Many of the statements contain "XX" - this is to indicate the opportunity for each agency to include a quantifiable measurement which meets their goals and objectives for the associated asset. This also assumes that the Town of Mesilla is not interested in constructing curb and gutter on the roadways under their management. This may change in the future, at which time the TASM Plan would be modified.

Table 17 – LOS Statements for Curb and Gutter	CLC	DAC	NMDOT	TOM
Recommended LOS Statement(s)				
Curb & Gutter will be provided on all arterial and collector roadways	✓			
Curb & Gutter will be provided where required to meet drainage concerns	✓			
All Curb & Gutter will be in "good" condition		✓	✓	
Not applicable				✓
	CLC	DAC	NMDOT	TOM
Recommended Performance Measure				
XX% of Curb & Gutter in "good" condition	✓	✓	✓	
Reduction of XX locations where drainage issues exist related to C&G (or lack of)	✓			
Not applicable				✓

a) *How to Achieve Level of Service Statements and Meet Performance Measures?*

The first step is building an inventory. No inventory data was received from any of the agencies on curb and gutter. The inventory could be as simple as a spreadsheet, could be a polyline GIS feature class, or there could be an attribute attached to the roadway GIS data that indicates whether curb and gutter is provided along each roadway segment.

After building the inventory, a condition assessment program is needed. That program should specify the frequency that assets will be inspected, by whom, and where that information will be updated. An example of a condition rating scoring system is shown in Table 18. However, each agency can establish their own level of scoring based on customer and agency expectation for sidewalk condition.

Table 18 – Example Condition Scoring for Curb and Gutter/Sidewalks

Score	Condition	Description
81 to 100	New/Like New	No defects observed.
61 to 80	Good	Minor defects observed (less than 10% of surface area)
41 to 60	Fair	Structurally sound, but some defects such as displacement at joints, cracking, or spalling (between 10% and 20% of surface area)
21 to 40	Poor	Major defects that indicate that major repair is needed, includes major cracking, displacement, spalling, or cracking.
0 to 20	Failed - Replace	Repair not possible. Replacement needed.

2. ABOUT CURB AND GUTTER IN THE MPO REGION

Since no inventory was collected on curb and gutter, the following table provides an estimate of the miles of curb and gutter by jurisdiction (not ownership) based on the miles of roadway and percentage of that roadway that is provided with curb and gutter. As the inventory is established this information will be refined for each agency.

Table 19 – Estimated Quantities of Curb and Gutter in the MPO

MPO Entity	Roadway Miles	% of roadway with C&G	Miles of C&G*
City of Las Cruces	457	65%	594
Doña Ana County	1105	25%	553
NMDOT	596	10%	119
Town of Mesilla	19	50%	19

**calculated based on curb and gutter on both sides of roadway*

3. KEY ISSUES

The key issue in implementing an asset management approach to curb and gutter assets is to build and maintain an inventory, and conduct ongoing condition assessment.

4. STRATEGIES FOR MANAGING KEY ISSUES

If an inventory does not exist of curb and gutter, this data collection effort could be combined with the next Pavement Condition inspection. There are several companies that provide mobile data collection services by mounting imaging equipment on vehicles that is used to later extract and geospatially reference data. This would aid in building a GIS data set of curb and gutter at least within the City, where the majority of these types of assets are located.

5. REMAINING LIFE & LIFE CYCLE COST

From the CLC PMAR, the total value of curb and gutter and drainage improvements was estimated at $50.5M, or 10% of the City’s network value, where the “network” includes pavements, subgrade and base, sidewalks and ramps, signs and striping, landscaping, and miscellaneous. This value does not take into account the condition of the curb and gutter assets, as it was estimated based on an overall unit replacement cost for roadways at $1.1M per mile.

Roundabout with Curb and Gutter in Las Cruces

The estimated useful life of concrete curb and gutter is 50 to 80 years (reference New Mexico Environment Finance Center (NMEFC) Asset Management Guide). For this study, the asset life for curb and gutter used was 50 years. The following table displays an asset management approach to valuing the assets in the MPO region.

Table 20 – Life Cycle Cost Method for Curb and Gutter

	Miles of C&G	Replacement Cost ($/mile)	Asset Life (yrs.)	Remaining Life (yrs.)	% of Replacement Cost	100% Replacement Cost	Value Based on Condition
City of Las Cruces	594	$ 105,600	50	30	60%	$ 62,736,960	$ 37,642,176
Doña Ana County	553	$ 105,600	50	30	60%	$ 58,344,000	$ 35,006,400
Town of Mesilla	19	$ 105,600	50	30	60%	$ 2,006,400	$ 1,203,840
NMDOT	119	$ 105,600	50	30	60%	$ 12,587,520	$ 7,552,512
MPO Total	**1,285**					$ 135,674,880	$ 81,404,928

6. ASSET RISK AND WAYS TO MANAGE RISK

The tables below present a recommended scoring system for initial implementation of an asset management approach. This system should be customized by the agencies based on the best available data. The Condition Score shown in Table 21 reflects the suggested condition scores in Table 18.

Table 21 – Likelihood of Failure Scoring Curb and Gutter

Score	Condition Score	Condition
1	81-100	New/Like New
2	61 to 80	Good
3	41 to 60	Fair
4	21 to 40	Poor
5	0 to 20	Failed

Table 22 – Consequence of Failure Scoring Curb and Gutter

Score	Consequence	Roadway Class
1	Very Low	residential
2	Low	local
3	Medium	collector
4	High	arterial
5	Very High	highway/interstate

7. HISTORIC EXPENDITURES AND REVENUE PLAN

A revenue plan for curb and gutter assets would be based on an inventory of those assets, and the condition and remaining life of the assets. Once that information is compiled, the cost of providing the level of service can be determined, and the criticality of the assets can be used for prioritization. This will allow development of a revenue plan that schedules expenditures for maintenance and capital improvements in accordance with budget expectations.

Recommendations – Curb and Gutter:

- ***Build inventory and condition assessment schedule for this asset***

C. LIFE CYCLE MANAGEMENT – *SIDEWALKS*

1. LEVEL OF SERVICE STATEMENTS AND PERFORMANCE MEASURES

The following level of service statements and associated performance measures are presented as starting points for this asset - *sidewalks*. They were established in conjunction with the MPO TAC and BPAC, but are expected to be refined as the TASM Plan is implemented. The "XX" - indicates the opportunity for each agency to include a quantifiable measurement which meets their goals and objectives for the associated asset.

Table 23 – LOS Statements for Sidewalks	**CLC**	**DAC**	**NMDOT**	**TOM**
Recommended LOS Statement(s)				
Continuous sidewalks will be provided for 100% of all transit stops by Year 2020	✓			
All sidewalks in "good" condition	✓			
Continuous sidewalks on all County roads that provide residential / commercial access		✓		
Needs to be established by Agency			✓	✓
	CLC	**DAC**	**NMDOT**	**TOM**
Recommended Performance Measure				
XX% of transit stops accessible as defined by continuous sidewalk and ADA compliant ramps for road segment containing stop	✓			
XX% of sidewalks in "good" condition	✓		✓	✓
XX% of roads with residential / commercial access with sidewalks		✓		

a) *How to Achieve Level of Service Statements and Meet Performance Measures?*

The first step in asset management of sidewalks is building an inventory. No inventory data was received from any of the agencies on sidewalks. The inventory could be as simple as a spreadsheet. It could also be a polyline or polygon GIS feature class, or an attribute attached to the roadway GIS data that indicates whether sidewalk is provided along each roadway segment.

After building the inventory, a condition assessment program is needed. That program should specify the frequency that assets will be inspected, by whom, and where that information will be updated. An example of a condition rating scoring system was given previously in Table 19 in the section on curb and gutter, but this scoring criteria is relevant to sidewalks as well.

2. ABOUT SIDEWALKS IN THE MPO REGION

No inventory was received on sidewalks. Therefore, the following table includes estimates of the miles of sidewalk by jurisdiction (not ownership) based on the miles of roadway and percentage of that roadway that is assumed to have sidewalks as derived from the County GIS data.

Table 24 – Estimated Quantities of Sidewalks in the MPO

	Roadway Miles	% of Roadway with Sidewalks	Miles of sidewalk*
City of Las Cruces	457	50%	457
Doña Ana County	1105	10%	221
Town of Mesilla	19	25%	10
NMDOT	596	0%	0
MPO Total			**688**

**County GIS data calculated based on sidewalk on both sides of roadway*

3. KEY ISSUES

The key issue in implementing an asset management approach to sidewalk assets is building and maintaining an inventory as well as conducting ongoing condition assessment.

A key issue cited by stakeholders during this project was the continuity of sidewalks, and in particular on transit routes. Assessing the continuity of sidewalks is an important activity that should be scheduled by the stakeholder agencies.

Pedestrian Facilities in Las Cruces

4. STRATEGIES FOR MANAGING KEY ISSUES

As with curb and gutter, the data collection effort for sidewalks could be combined with the next Pavement Condition inspection. The collection of geo referenced data would allow building a GIS data set of sidewalk at least within the City, where the majority of these types of assets are located. In addition, building a database of sidewalk assets that is spatially referenced will allow efficient examination of potential continuity issues and opportunities.

5. REMAINING LIFE & LIFE CYCLE COST

From the CLC PMAR, the total value of sidewalks and ramps was estimated at $56.7 million, or 12% of the City's network value, where the "network" includes pavements, subgrade and base, sidewalks and ramps, signs and striping, landscaping, and miscellaneous. This value does not take into account the condition of the sidewalk assets, as it was estimated based on an overall unit replacement cost for roadways of $1.1 million per mile.

The estimated useful life of concrete sidewalks is 50 years. Although some sidewalks have been known to last longer than 50 years, it is the industry standard and provides a conservative estimate for evaluating maintenance and replacement costs. The following table displays an asset management approach to valuing sidewalk assets in the MPO region.

Table 25 – Life Cycle Cost Method for Sidewalks

	Miles of sidewalk	Replacement Cost ($/mile)	Asset Life (yrs)	Remaining Life (yrs)	% of Replacement Cost	100% Replacement Cost	Value Based on Condition
City of Las Cruces	457	$ 150,000	50	30	60%	$ 68,550,000	$ 41,130,000
Doña Ana County	221	$ 150,000	50	30	60%	$ 33,150,000	$ 19,890,000
Town of Mesilla	10	$ 150,000	50	30	60%	$ 1,425,000	$ 855,000
NMDOT	0	$ 150,000	50	30	60%	$ -	$ -
MPO Total	**688**					**$ 103,125,000**	**$ 61,875,000**

6. ASSET RISK AND WAYS TO MANAGE RISK

Tables 26 and 27 below present a recommended scoring system for initial implementation of an asset management approach to sidewalks. This system should be customized by the agencies based on the best available data. The Condition Score shown in Table 26 reflects the suggested condition scores in Table 18 (Curb and Gutter Section). The consequence scoring is shown based on land uses, but other criterion could be identified and incorporated.

Table 26 – Likelihood of Failure Scores – Sidewalks

Score	Condition Score	Condition
1	81-100	New/Like New
2	61 to 80	Good
3	41 to 60	Fair
4	21 to 40	Poor
5	0 to 20	Failed

Table 27 – Consequence of Failure Scoring – Sidewalks

Score	Consequence	Usage
1	Very Low	Residential; no critical land uses
2	Low	Collector; no critical land uses
3	Medium	Arterial street with commercial access
4	High	Access to schools
5	Very High	Transit access

7. HISTORIC EXPENDITURES AND REVENUE PLAN

A revenue plan for sidewalk assets would be based on an inventory of those assets, and the condition and remaining life of the assets. The revenue plan would include repair and replacement of existing sidewalks, and the cost of installing new sidewalks.

Once that information is compiled, the cost of providing the level of service can be determined, and the criticality of the assets can be used for prioritization. This will allow development of a revenue plan that schedules expenditures for maintenance and capital improvements. It will also provide a basis for financial support expectations from private development as it relates to sidewalk construction.

Recommendations – Sidewalks:

- ***Build inventory and condition assessment schedule for this asset***

D. LIFE CYCLE MANAGEMENT – *TRANSIT STOPS*

1. LEVEL OF SERVICE STATEMENTS AND PERFORMANCE MEASURES

The following level of service statements and associated performance measures are presented as starting points for this asset – *transit stops*. They were established through communication with the agencies but are expected to be refined as the TASM Plan is further implemented. The statements contain “XX” - this is to indicate the opportunity for each agency to include a quantifiable measurement which meets their goals and objectives for the associated asset. At this time, the City of Las Cruces is the only agency which constructs and maintains transit stops. If this changes in the future, the TASM Plan would be modified.

Table 28 – LOS Statements for Transit Stops	**CLC**	**DAC**	**NMDOT**	**TOM**
Recommended LOS Statement(s)				
All transit stops will be provided with a sign, bench & shelter by Year 2020	✓	✓	✓	✓
Transit stop facilities will be in “good” condition	✓	✓	✓	✓
Recommended Performance Measure				
XX% transit stops with sign, bench, & shelter	✓	✓	✓	✓
Transit stops in “ good” condition	✓	✓	✓	✓

a) *How to Achieve Level of Service Statements and Meet Performance Measures?*

Transit stop facilities are implemented according to a hierarchy. All stops are provided with a sign. Some stops are provided with a sign plus a bench. Some stops are provided with a sign, bench, and shelter. Some questions asked as part of the decision-making process for adding a bench or shelter at a particular stop (according to the Road Runner Transit Administrator, Mike Bartholomew) are as follows:

1. How often is the stop used?
2. Are there site constraints?
   - Does ROW or easements need to be obtained?
   - How receptive is the property owner to the City acquiring needed ROW or easement?
   - Does a private property owner offer to donate ROW or even “adopt” a bus shelter?

- o Are there construction challenges at the site (slopes, private landscaping, existing structures such as building walls or retaining walls, and irrigation structures?
- o Is there accessible access to the site?
- o Would having a bus stop at a certain locations impact traffic flow?

3. What is the cost to address the site constraints?
4. Is there funding to develop the site and purchase bus shelters?

"In general, sites with the fewest constraints (and consequently the lowest cost to develop) are moved up on the priority list for placing bus shelters."

Overall, a prioritized schedule for adding benches and shelters to those stops that do not have them today is needed, as is an inspection program to regularly verify the condition of facilities.

2. ABOUT TRANSIT STOPS IN THE MPO REGION

Figure 8 shows the Transit Stops in the MPO. The following table shows transit stops and their facilities in the MPO boundary, based on GIS data received from the MPO. It appears that the records with Null values in the Facilities fields may be data entry mistakes, as the other fields for those records are blank.

Table 29 –Transit Stops in the MPO

Route	Total Stops	Sign	Bench	Shelter	Null
10	36	32	2	1	1
20	51	41	2	8	0
30	47	40	1	5	0
40 & 50	45	35	1	8	1
70	36	26	3	7	0
80	47	37	1	8	1
90	44	31	0	13	0
Total	**306**	**242**	**10**	**50**	**3**

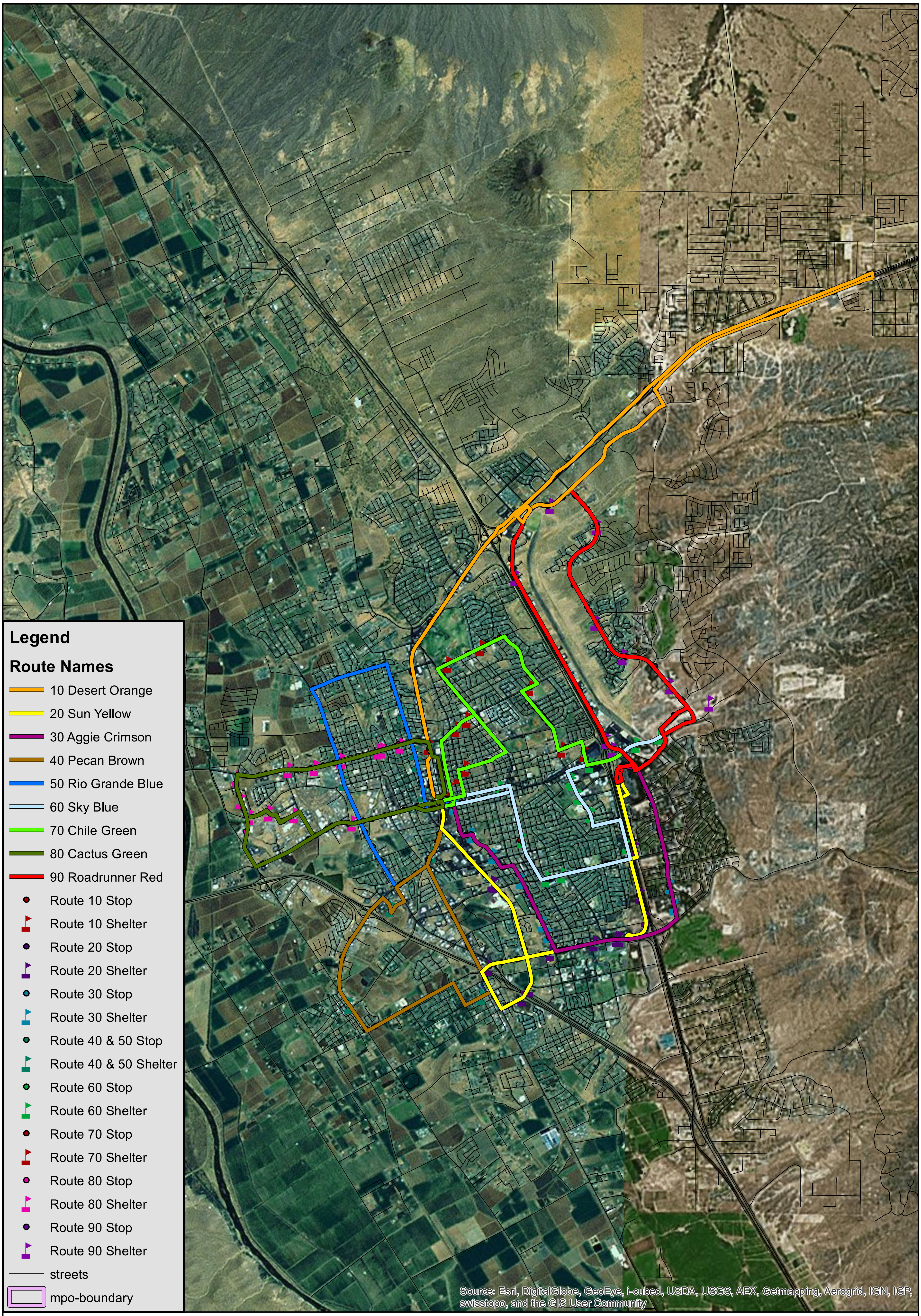


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Figure 8
TRANSIT STOPS IN THE MPO

Mesilla Valley MPO
Transportation Asset Safety Management Plan

P:\20130348\WR\Calculations\Programs\ArcGIS\Transit Stops.mxd
Author: kwoods

June 2014

3. KEY ISSUES

The key issue with achieving the level of service statement for transit stops is funding for improvements. Another key issue associated with asset management of transit stops in the MPO region is implementation of a condition inspection program and linking the condition data to the GIS database.

As shown in Table 30, most transit stops are equipped only with a sign. The cost of adding benches and shelters to all stops will be significant. In addition, there are associated challenges to providing improved facilities at transit stops. Those challenges include the following:

- Adequate easements and right-of-way
- Lack of ADA- compliant access and
- Continuous sidewalks

Transit Stop with Shelter along Picacho Boulevard

4. STRATEGIES FOR MANAGING KEY ISSUES

The current inventory of transit stops should include an assessment of ADA compliant accessibility en route to the transit stop. The overall cost of implementation of the level of service statement should be examined in light of available funding. In addition, the cost of expanded transit service and associated facilities should be considered, along with the cost of maintenance, repair and replacement of existing facilities.

5. REMAINING LIFE & LIFE CYCLE COST

The following table displays an asset management approach to valuing transit stop assets.

Table 30 – Life Cycle Cost Method for Transit Stop Facilities

Facilities Provided	Number	Replacement Cost	Asset Life (Yrs.)	Average Remaining Life	% of Replacement Cost	100% Replacement	Value Based on Condition
Sign Only	242	$350	10	7	70%	$84,700	$59,290
Sign + Bench	10	$850	10	8	80%	$8,500	$6,800
Sign + Bench + Shelter	50	$4,450	20	12	60%	$222,500	$133,500
MPO Total	**302**					**$315,700**	**$199,590**

6. ASSET RISK AND WAYS TO MANAGE RISK

A condition scoring system, such as that shown in Table 18, should be established for use by field staff when conducting inspections. This should be developed for each type of transit facility (sign, bench, shelter). Then, a scoring for the likelihood of failure and the consequence of failure should be considered for the overall asset. The consequence scoring could be based on ridership numbers or land use along the route. This would be further refined as the TASM Plan is implemented.

7. HISTORIC EXPENDITURES AND REVENUE PLAN

A revenue plan for transit stops would be based on a prioritized capital improvements plan that adds facilities as defined by the level of service statement, programs additional transit stops with associated facilities, and incorporates facility replacements.

Based on 242 transit stops that have a sign only, the estimated cost of adding a bench to all of these locations is $121,000. The estimated cost of adding a shelter to all of these locations is $871,200, plus an additional $36,000 to add shelters to those locations that already have a bench. The total cost of achieving the stated level of service statement in Table 31 is thus a little over $1 million. An annual revenue plan might look something like the following.

Table 31 – Sample Revenue Plan – Transit Stops

Description	# Per year	Unit Cost	Annual Cost
Transit Stop Improvements			
Annual cost of adding benches at existing stops	14	$500	$7,000
Annual cost of adding shelters at existing stops	15	$3,600	$54,000
Maintenance and Repair			$50,000
Facility Replacement			
Annual cost of sign replacement	25	$350	$8,750
Annual cost of bench replacement	5	$500	$2,500
Annual cost of shelter replacement	2	$3,600	$7,200
System Expansion			
Signs at new stops	5	$350	$1,750
Benches at new stops	5	$500	$2,500
Shelters at new stops	5	$3,600	$18,000
		Total Annual Budget	**$151,700**

Recommendations – Transit Stops:

- ***Develop prioritization process for enhancing transit stops***
- ***Include sidewalk connectivity and ADA compliance in the data base for transit stops***

E. LIFE CYCLE MANAGEMENT – *TRAILS (BICYCLE, PEDESTRIAN, EQUESTRIAN)*

1. LEVEL OF SERVICE STATEMENTS AND PERFORMANCE MEASURES

The following level of service statements and associated performance measures are presented as starting points for this asset – *trails*. They were established through communication with the agencies but are expected to be refined as the TASM Plan is further implemented. The statements contain "XX" - this is to indicate the opportunity for each agency to include a quantifiable measurement which meets their goals and objectives for the associated asset. Trails is a very general term and it is expected that as the TASM Plan is implemented, this category might benefit from further delineation into the type of trails (as an asset) being managed.

Table 32 – LOS Statements for Trails	**CLC**	**DAC**	**NMDOT**	**TOM**
Recommended LOS Statement(s)				
Increase miles of **pedestrian** facilities by XX miles per year	✓			✓
Increase miles of **bicycle** facilities by XX miles per year		✓		
Increase miles of **equestrian** facilities by XX miles per year				✓
Maintain all trails in "good" condition			✓	
Recommended Performance Measure				
Miles of **pedestrian** facilities	✓			
Miles of **bicycle** facilities		✓		
Miles of **equestrian** facilities				✓
XX% of trails are in " good" condition			✓	

a) *How to Achieve Level of Service Statements and Meet Performance Measures?*

An inventory of current and proposed trails is represented as part of the MPO Trail Systems Priorities and Policies Plan, and the In-Road Bicycle System Priorities and Policies Plan. Within these documents they are delineated as Tier 1, Tier 2, and Tier 3. For this project, GIS files of recreations trails in the County, existing and proposed trails within the City, and bike facilities were received and represent an adequate database for this asset.

However, an inspection system for trail facilities that connects to this inventory information needs to be developed.

2. ABOUT TRAILS IN THE MPO REGION

The following tables summarize the GIS information received from the MPO on trails. The Tier level is not indicated in the GIS data; however, this would be a useful attribute to add.

Table 33 – Summary of Bicycle Facilities in the MPO

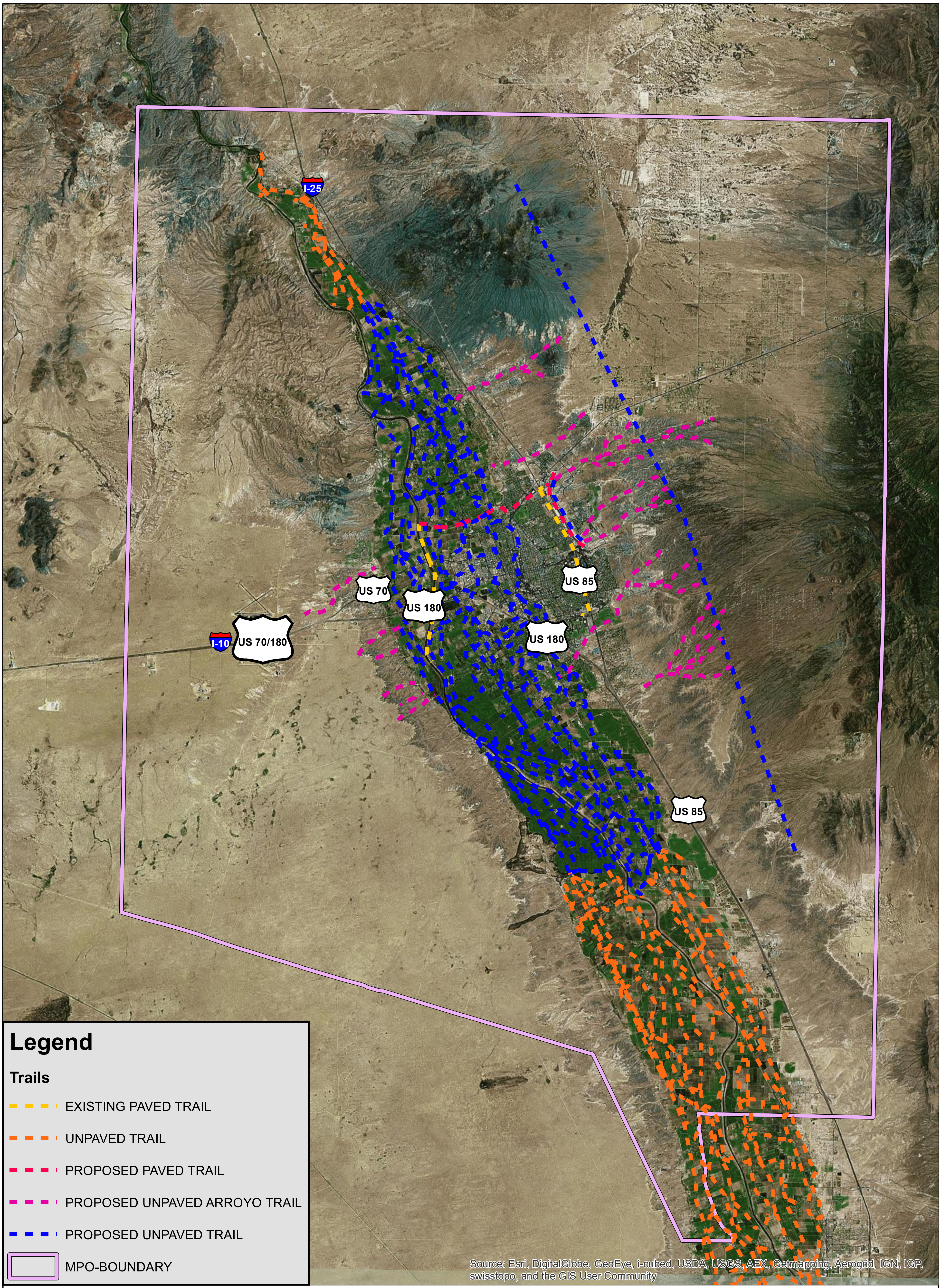
Facility Type	Miles
Existing Bike Lane	56
Existing Share the Road	34
Proposed Bike Lane	473
Proposed Share the Road	3
Multi-Use Path	3
Total	**570**

Table 34 – Summary of Trails

Designation	Miles
Existing Paved Trail	9
None (assume Unpaved Trail)	414
Proposed Paved Trail	7
Proposed Unpaved Arroyo Trail	59
Proposed Unpaved Trail	259
Total	**748**

Table 35 – Summary of Recreation

Trail name	Miles
Bar Canyon Trail	9
Baylor Canyon Trail	15
Crawford Canyon Trail	3
Doña Ana Mountain - Trail System	22
Dripping Springs Trail	5
Filmore Trail	3
La Cueva Trail	3
Picacho Peak Trail System	27
Pine Tree Trail	4
Sierra Vista Trail	80
SST Trail System	7
Texas Canyon Trail	2
Tortugas Mountain Trail System	10
Equestrian Use Allowed	16
Total	**204**



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10 Miles

FIGURE 9
TRAILS IN THE MPO

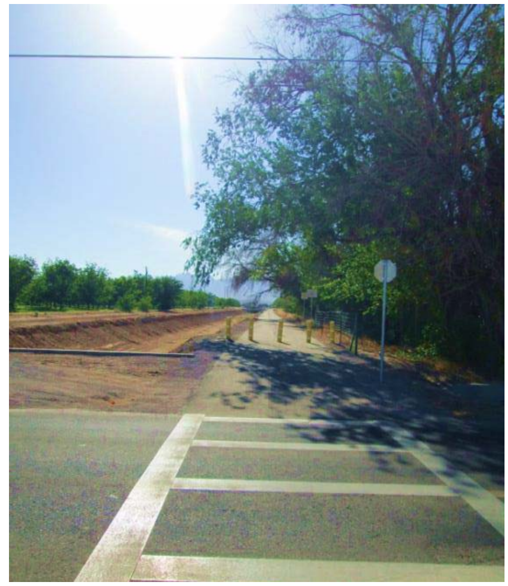
Mesilla Valley MPO Transportation Asset Safety Management Plan

June 2014

3. KEY ISSUES

Issues identified with the implementation of an asset management approach to managing trail assets include the following:

- Although there is a prioritized trail plan, the majority of planned improvements are unfunded.
- A database that combines the proposed trails with their funding status and prioritization is needed.
- A condition inspection program is needed and condition information needs to be linked to the GIS database.



Multi-Use Trail

4. STRATEGIES FOR MANAGING KEY ISSUES

As funding is identified, the information on funded projects should be input to a database that can be linked to the GIS trail map. This will allow the use of this data for asset management. A condition inspection program needs to be developed by the agencies that are responsible for trail maintenance to define how trails will be rated such that their remaining life can be estimated, and maintenance, repairs or replacement can be programmed.

5. REMAINING LIFE & LIFE CYCLE COST

The following table displays an asset management approach to valuing trail assets.

Table 36 – Life Cycle Cost Method for Trails

Facility	Miles	Replacement Cost ($/mi)	Asset Life (yrs.)	Remaining Life (yrs.)	% of Replacement Cost	100% Replacement	Value Based on Condition
Bike Lanes	56	$ 145,000	25	15	60%	$ 8,120,000	$ 4,872,000
Share the Road	34	$ 145,000	25	15	60%	$ 4,930,000	$ 2,958,000
Paved Trail	19	$ 145,000	25	15	60%	$ 2,755,000	$ 1,653,000
Unpaved Trail	25	$ 50,000	10	5	50%	$ 1,250,000	$ 625,000
Unpaved Recreation Trail	204	$ 50,000	10	5	50%	$ 10,200,000	$ 5,100,000
MPO Total	**338**					**$27,255,000**	**$15,208,000**

6. ASSET RISK AND WAYS TO MANAGE RISK FOR TRAILS

A condition scoring system, such as that shown in Table 17, should be established for inspections of trail facilities. Table 37and Table 38 below present a recommended scoring system for initial implementation of an asset management approach to trails. This system should be customized by the agencies responsible for maintenance and inspections based on the best available data. The consequence scoring system is based on the type of trail and whether the trail shared the road with motorized vehicles. Other criterion could be identified and incorporated as desired by the agencies, such as land use connections.

Table 37 – Likelihood of Failure Scores – Trails

Score	Condition Score	Condition
1	81-100	New/Like New
2	61 to 80	Good
3	41 to 60	Fair
4	21 to 40	Poor
5	0 to 20	Failed

Table 38 – Consequence of Failure Scores – Trails

Score	Consequence	Usage
1	Very Low	Pedestrian Only
2	Low	Pedestrian/Bicycle Use
3	Medium	Multi-Use or Equestrian
4	High	Share the Road
5	Very High	Share the Road – major arterial roadway

7. HISTORIC EXPENDITURES AND REVENUE PLAN

A revenue plan for trails would include both the planned future improvements and the repair and maintenance on existing improvements. An important part of an asset management approach is assessing the condition and remaining life of the existing assets; however, based on the miles of planned trails, the majority of costs for the upcoming years may be in building new facilities. As the planned facilities are built, the costs will shift such that more funds are spent on maintenance, repair and replacement, and less on new improvements.

Recommendations – Trails:

- ***Further delineation by each agency as to the type of trail systems included in the TASM Plan***
- ***Development of a GIS referenced condition evaluation process***

F. LIFE CYCLE MANAGEMENT – *SIGNS*

1. LEVEL OF SERVICE STATEMENTS AND PERFORMANCE MEASURES

The following level of service statements and associated performance measures are presented as starting points for this asset - *signage*. They were established in conjunction with the MPO TAC and BPAC, but are expected to be refined as the TASM Plan is implemented. The "XX" - indicates the opportunity for each agency to include a quantifiable measurement which meets their goals and objectives for the associated asset.

Table 39 – LOS Statements for Signs

	CLC	DAC	NMDOT	TOM
Recommended LOS Statement(s)				
Signs are provided at all locations required by MUTCD	✓			
XX% of signs will have retro-reflectivity / visibility as required by MUTCD at all times		✓		✓
Damaged signs will be repaired with XX hours of reporting			✓	
Recommended Performance Measure				
XX% of locations in compliance with MUTCD	✓			
XX% of signs with compliant retro-reflectivity/visibility		✓		✓
XX% of reports responded to within XX hours			✓	

a) *How to Achieve Level of Service Statements and Meet Performance Measures?*

The requirements for sign placement, installation, maintenance and retro-reflectivity are described in the Manual on Uniform Traffic Control Devices (MUTCD), published by the FHWA under 23 Code of Federal Regulations (CFR) Part 655, Subpart F.

Measuring how the agencies within the MPO are complying with MUTCD requires a spatially located inventory, and an evaluation and comparison to the locations requiring signs. This effort should be undertaken by qualified staff within each agency.

Achieving the level of service statement for retro-reflectivity will require field inspections and record keeping. This effort can be combined with overall condition assessment of signs.

Achieving the level of service for response to damaged signs can be measured through a work order system.

2. About Signs in the MPO Region

The City reportedly maintains over 14,000 signs (from City web site). For this project, no sign inventory information was provided by any of the management agencies. If an inventory does not exist of signs, this data collection effort could be combined with the next Pavement Condition inspection, as was also recommended for curb and gutter as well as sidewalks. This would allow a GIS data set of signs to be built, to which condition information could be linked.

3. Key Issues

Signs and Pedestrian Facility in Las Cruces

An inventory of signs is needed to provide a baseline value of the assets. This inventory would include the location and type of sign for all roadway signs (regulatory, directional, and informational). A condition assessment program is needed to identify the condition of sign assets and their expected remaining life. A comprehensive assessment of the overall system compliance with regulations regarding signs will also need to be completed so that prioritization of expenditures can be done. In addition to this, local agencies may want to include optional signage so that the associated costs, based on the local priorities, can be considered. The cost to improve the transportation system cannot be forecast without this, as sign maintenance and installation is expensive.

4. Strategies for Managing Key Issues

The following activities are recommended to manage the key issues.

- Determine which signs are to be included in the asset management data base for each agency.
- Create GIS database of signs.
- Assess regulatory compliance of signs and the cost to bring sign inventory up to desired level of service.
- Develop assessment program for signs consisting of field inspections, updates to the database, and development of a schedule for repairs and replacements.
- Develop improvements program to implement level of service goals.

The City web site contains a form for reporting missing or damaged signs: (http://askthecity.las-cruces.org/). Based on this, some record of the number of missing or damaged signs is available. Ideally, this would be linked to a work order system that reports when the sign was fixed or replaced, and the cost of that activity. This type of information is an example of data that should be fed into the TASM Plan.

5. REMAINING LIFE & LIFE CYCLE COST

From the CLC PMAR, the total value of signs and striping improvements was estimated at $6.9M, or 1% of the City's network value, where the "network" includes pavements, subgrade and base, sidewalks and ramps, signs and striping, landscaping, and miscellaneous. This value does not take into account the condition of sign assets, as it was estimated based on an overall unit replacement cost for roadways of $1.1M per mile.

The estimated useful life of a sign used for this study is 10 years. The following table displays an asset management approach to assigning value to sign and striping assets in the MPO.

Table 40 –Life Cycle Cost Method for Signs and Striping

Facility	Qty	Unit	Replacement Cost	Asset Life (yrs.)	Remaining Life (yrs.)	% of Replacement Cost	100% Replacement	Value Based on Condition
Reflectorized Pavement Markings	457	miles	$4,500	10	5	50%	$2,056,500	$1,028,250
Signs	14,000	each	$350	10	5	50%	$4,900,000	$2,450,000
						Total	**$6,956,500**	**$3,478,250**

6. ASSET RISK AND WAYS TO MANAGE RISK

A condition scoring system, such as that shown in Table 17, should be established for conducting inspections of location and condition of signs. In conjunction with that, scoring criteria should be established for the likelihood of failure and the consequence of failure for each sign. The consequence scoring could be based on roadway classification, but other criterion could be identified and incorporated. This should be refined by each agency as the TASM Plan is implemented.

7. HISTORIC EXPENDITURES AND REVENUE PLAN

A revenue plan for signs would include both signs for future and planned roadways as well as for repair and replacement of existing signs. An important part of an asset management approach is assessing the condition and remaining life of the existing assets; to this end a condition inspection program needs to be developed and implemented, ideally linked to a GIS database of signs, before a revenue plan can be created.

Recommendations – Signs:

- ***Determine criteria for sign-types included in asset management***
- ***Create GIS database of signs.***
- ***Develop evaluation system to assess regulatory compliance of signs***

G. LIFE CYCLE MANAGEMENT – *DRAINAGE INFRASTRUCTURE*

1. LEVEL OF SERVICE STATEMENTS AND PERFORMANCE MEASURES

Drainage infrastructure is a broad category and includes a variety of asset types required to address drainage issues associated with the transportation system: major culverts, pipes, channels, ponds, and more. We have isolated curb and gutter as an individual asset under this Plan, but in application it too can be considered drainage infrastructure. Although broad in scope, it is important that drainage infrastructure be considered when creating an asset management plan due to the direct cost associated and risk involved when they fail. It will be important for each agency to establish an evaluation process, level of service statement, and performance measure for these additional assets as part of the implementation of the TASM Plan. The following level of service statement and associated performance measure presented is very general and just considered an overall starting point for this asset – *drainage infrastructure*.

Table 41 – LOS Statements for Drainage Infrastructure	**CLC**	**DAC**	**NMDOT**	**TOM**
Recommended LOS Statement(s) 100% of drainage infrastructure will meet the demand of a 100-yr flood	✓	✓	✓	✓
Recommended Performance Measure XX% of drainage infrastructure will meet the demand of a 100-yr flood	✓	✓	✓	✓

a) *How to Achieve Level of Service Statements and Meet Performance Measures?*

Although major culverts (over 10-feet in width) are considered bridges by the NMDOT, they are not evaluated under the NBI; therefore, type-specific evaluation criteria will need to be established for the various drainage assets – including major culverts.

2. KEY ISSUES

The key issue with managing to the level of service defined will be creating an accurate existing conditions database, developing an inspection schedule and documentation process, and potential cost for improvement.

3. STRATEGIES FOR MANAGING KEY ISSUES

Drainage Infrastructure in Doña Ana County

As stated, drainage infrastructure can be a stand-alone element or an associated component of the transportation system. Understanding when and how it is more effective to make improvements to the drainage facilities associated with the transportation system is critical to good asset management. Each agency needs to track the scheduled improvements, and whether the improvements are being completed within the most effective time frame and most effective project initiative. Fully integrating drainage infrastructure into the implementation of the TASM Plan is critical to accurately managing transportation assets and the associated costs.

Given the variation in types of drainage infrastructure, the TASM Plan doesn't identify the life-cycle, life-cycle costs, evaluation of risks, or consequences of failure. That will have to be done by each agency as the TASM Plan is implemented.

4. HISTORIC EXPENDITURES AND REVENUE PLAN

Since drainage infrastructure is sometimes addressed outside the scope of transportation improvements (although not as efficient), it is important to clarify the potential sources of revenue. Is the drainage infrastructure budget isolated to the transportation asset budget or are there additional sources available within other departments of each agency or at the state/federal level? This information will be needed to create an accurate budget for both maintenance and replacement activities, and will benefit from a more comprehensive financial evaluation.

Recommendations:

- ***Establish and adhere to condition inspection and documentation process for drainage infrastructure***
- ***Develop level of service and performance measures for various types of drainage assets***
- ***Develop unit costs for various drainage infrastructure types***
- ***Complete a comprehensive financial evaluation of drainage improvement funding sources***

IX. TRAFFIC SAFETY MANAGEMENT

Incorporating safety into your transportation asset management plan allows your agency to relate safety records to physical assets. In this way, agencies can identify their highest priority safety program areas, such as intersections, pedestrians, run-off-road incidents, or cross median crashes, and adopt strategic and program goals that focus resources on the areas of greatest need. For example, a target goal of a 20% reduction in cross median crashes could include strategies such as installing a median barrier system. Sharing this data amongst different departments, divisions, or agencies adds value to your decision making process.

A. OVERVIEW OF HSIP

The Highway Safety Improvement Program (HSIP) is a core program of the Federal Highway Administration (FHWA). The purpose of HSIP is to reduce fatalities and injuries on public roads. In New Mexico, the HSIP has the responsibility to systematically analyze roadways and available crash data to identify locations with current or possible severe crash safety needs. The roadways analyzed include all public roadways: local, county, tribal, state and U.S. highways, and interstates. The HSIP considers safety improvement projects in support of and consistent with the New Mexico Comprehensive Transportation Safety Plan (CTSP).

As part of the HSIP, the NMDOT is required to submit an annual “Transparency Report” describing not less than 5% of the public roadway locations representing the state’s most pressing safety needs.

B. CRASH DATA

All of New Mexico’s state police and local law enforcement agencies are required to report all investigated crashes to the NMDOT within 24 hours of completing the investigation. Crash data are entered on the New Mexico Uniform Crash Report (UCR) form in order to standardize reporting. The NMDOT Traffic Safety Division contracts with the University of New Mexico, Division of Governmental Research (UNM DRG) to process, analyze, clean up, and geo-code (assign spatial coordinates) crash records. Each year, approximately 70,000 crashes are processed; typically approximately 80 to 85% are able to be geocoded. Figure 10 displays crash data from 2010 and 2011 within the MPO area.

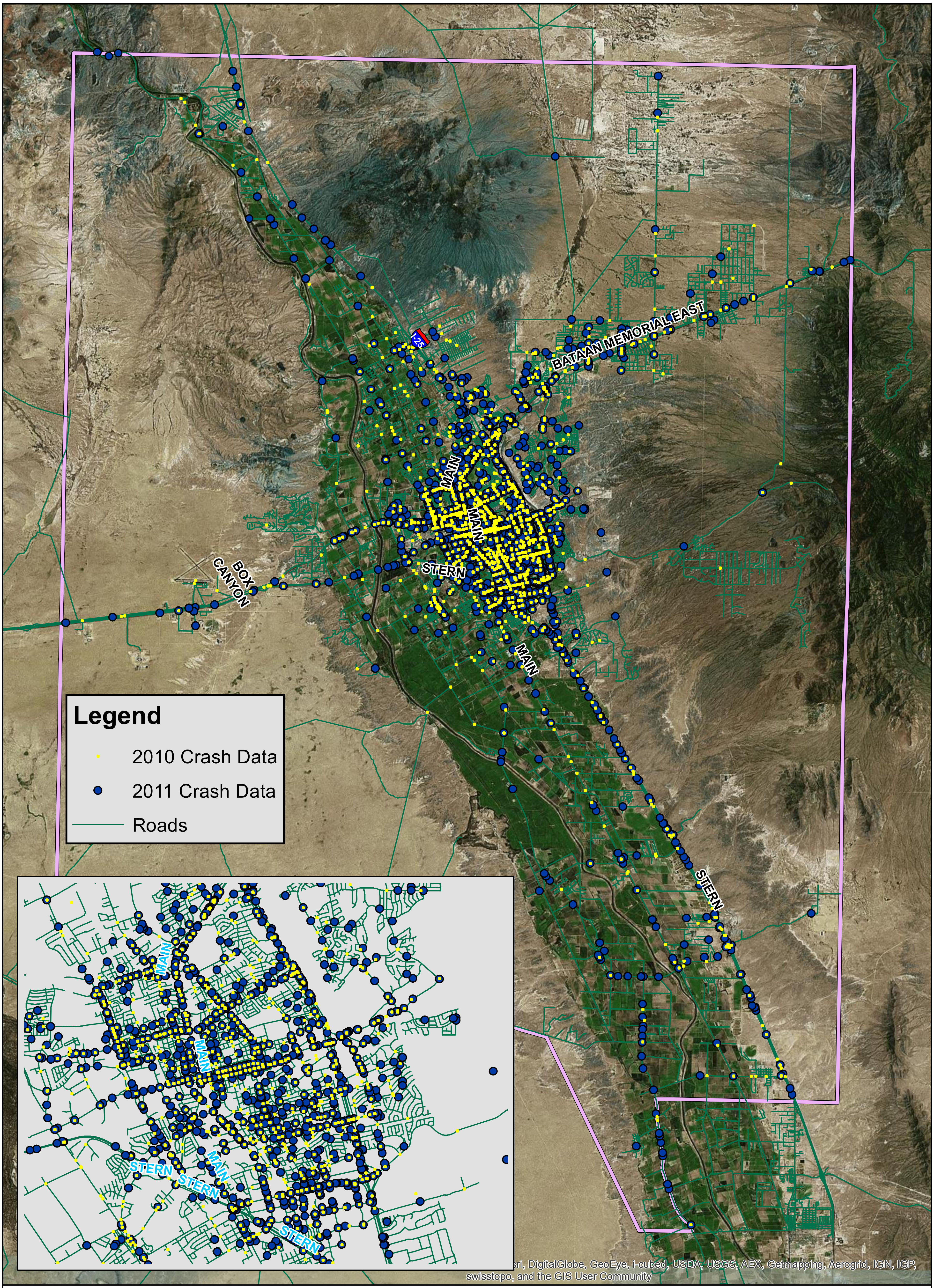


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FIGURE 10

2010 and 2011 CRASH DATA IN THE MPO REGION

Mesilla Valley MPO Transportation Asset Safety Management Plan

June 2014

There are a number of limitations of the crash data; however, this data represents the best available information. The following are the limitations that are enumerated in the 2012 Transparency report

1. *Accuracy of location.* The UCR includes fields for recording the coordinates of the crash location; however, the implementation of equipment to record the location information has not been statewide. Many reporting officers enter information in terms of closest intersection, milepost, etc. Many times, manual entries contain discrepancies in route name spelling, distance estimations, etc. Crashes in rural areas pose specific challenges, as many times there are no mileposts, intersecting roadways, or identifying signs in close proximity.
2. *Reporting of Crashes.* NMDOT estimates that approximately 75,000 crashes are unreported statewide each year. Examples of unreported crashes include those in rural and tribal area, animal-vehicle collisions, and urban crashes during peak congestion or severe weather periods.
3. *Data Management and Transmittal.* Some local jurisdictions collect and transmit reports electronically while some complete the UCR manually in paper form. Some data is sent by NMDOT to off-site locations for data cleaning and geocoding and then is processed again when it is returned to NMDOT for other programs. This process results in duplicate data in different databases, and introduces opportunities for error in reporting.
4. *Other Issues.* The “contributing factors” information on the UCR is not always included or may not be coded accurately on the crash report. Additionally, causal factors, as well as the type of crash, are based on the reporting officer’s judgment, and therefore may not always accurately identify circumstances related to the crash.

C. ANALYSIS CATEGORIES AND METHODOLOGY

Crashes are grouped into the following analysis categories for selection of the top 5 percent severe crash locations:

1. Intersections
   a. Urban
   b. Rural

2. Roadway Segments
    a. Urban
        i. Interstate
        ii. U.S. and State Highways
        iii. Other Roadways
    b. Rural
        i. Interstate
        ii. U.S. and State highways
        iii. Other roadways

The HSIP analysis focuses on crashes with the most serious outcomes. In New Mexico, crashes are classified into one of five categories of the KABCO scale based on the most severe injury outcome.

The KABCO scale is provided below.

K = fatality
A = incapacitating injury
B = visible non-incapacitating injury
C = possible injury
O = no injury/property damage only

The FY2012 Transparency Report examined crash records from 2007 through 2011. The method used to analyze the data is summarized below:

- KAB crashes were extracted from the dataset (24,112 fatal and severe injuries).
- The selected records were separated into two groups: intersection or non-intersection (aka roadway segments).
- Intersection crashes were assigned into urban and rural subcategories.
- Roadway segment crashes were assigned to the six categories (listed above) using a combination of data codes contained in each crash record.
- Roadway segment crashes were grouped by segment lengths. For urban interstates, these were between exits. For rural interstates, U.S. and state highways, these in 10 mile segments by milepost data. Urban other roadways and both urban and rural intersections were grouped based on major and minor street combinations in the crash records.

- Each fatal crash on a roadway segment or an intersection was assigned 9 points and each injury crash was assigned 9 points. To meet the initial screening, the threshold for this weighted crash frequency was set at a minimum of 15 points. This captured between 40 and 50 percent of the segments with reported crashes. Next, the top five percent of these locations with 15 or more points were selected to represent the severe crash safety needs for each analysis category.

D. RESULTS FOR THE MESILLA VALLEY MPO AREA

The results of the HSIP crash data analysis (i.e. the Top Five Percent) are presented in the Transparency Report in a series of tables, as listed below.

- Table IV-1A 2007-2011 Severe Crash Locations at Urban Intersections
- Table IV-1B 2007-2011 Severe Crash Locations at Rural Intersections
- Table IV-2A 2007-2011 Severe Crash Locations on Urban Interstate Highway Segments
- Table IV-2B 2007-2011 Severe Crash Locations on Rural Interstate Highway Segments
- Table IV-3A 2007-2011 Severe Crash Locations on Urban U.S. and State Highways
- Table IV-3B 2007-2011 Severe Crash Locations on Rural U.S. and State Highways
- Table IV-4A 2007-2011 Severe Crash Locations on Urban Other Roadways
- Table IV-4B 2007-2011 Severe Crash Locations on Rural Other Roadways

Tables IV-1A and IV-1B list 30 intersections, which had a total of 303 KAB crashes, with 14 resulting in fatalities and 289 resulting in incapacitating and visible, non-incapacitating injuries during the analysis period. The highest weighted intersection from these tables was El Paseo Road and Boutz Road in Las Cruces, with 13 KAB crashes representing 1 fatality and 12 injuries. A total of 4 intersections from Las Cruces are listed in Table IV-1A: El Paseo Rd & Boutz Rd, Lohman Ave & I-25 NB, Solano Dr. & Madrid Ave, Valley Dr/NM 185/NM188 & W. Picacho Ave/US70. No rural intersections from Doña Ana County, that are within in the MPO are listed in Table IV-1B.

The following excerpt from Table IV-1A shows the values for the four urban intersections located in Las Cruces. There are a total of 28 intersection listed in the full table, with weighted crash frequencies ranging from a low of 54 to a high of 81.

Table 42 – Excerpt from Table IV-1A, 2007-2011 Severe Crash Locations at Urban Intersections

Weighted Crash Frequency	Intersection	City	NMDOT District	Number of Crashes		
				KAB	Fatal	Injury
81	El Paseo Rd & Boutz Rd	Las Cruces	1	13	1	12
66	Lohman Ave & I-25 NB			11	0	11
57	Solano Dr & Madrid Ave			9	1	8
54	Valley Dr/NM 185/NM188 & W Picacho Ave/US 70			9	0	9

- No locations in the Mesilla Valley MPO are listed in Tables IV-2A and IV-2B.
- Three of the four locations listed in Table IV-3A are located in Las Cruces: US 70 at Melendres Street, NM 188 at Amador Ave/NM342, and NM188 near Hadley Avenue.
- Two locations in Doña Ana County are listed in Table IV-3B: NM 404 MP 0.0-9.0, and NM 28 MP 0.0-9.9.
- No locations in Las Cruces are listed in Table IV-4A.
- One location in Doña Ana County is listed in able IV-4B, Stern Drive.

With 26 percent of the Severe Crash Needs locations, District 1 has the highest number of fatal crashes on the list. Of the 21 locations in the District, 33 percent are at intersections.

E. TREATING THE SEVERE CRASH SAFETY-NEEDS LOCATIONS

NMDOT’s approach to the severe crash safety needs incorporates the “four E’s” – engineering, enforcement, education, and emergency response. The CTSP recommends numerous strategies that are focused on these elements.

Table 43 – Excerpt from Table VI-1,
Potential Strategies to Address New Mexico's Severe Safety Needs

Location	Predominate Crash Type & Characteristics	Primary Contributing Factor	CTSP Emphasis Area	Applicable Strategies (Impediments Other than Cost/Funding)*	Other Potential Strategies
El Paseo Rd & Boutz Rd, Las Cruces	Rear-end, angle	Following too closely, excessive speed, red light running, failure to yield	#1 Aggressive Driving & Speeding #3 Emergency Response	AG-2, AG-3, AG-4 (1), EM-1	Modify signal timing (exclusive left-turn phasing, optimize clearance intervals), advance intersection warning signs

F. IMPLICATIONS TO THE TASM PLAN FROM THE HSIP PROGRAM

The annual analysis of geo-coded crash data represents valuable input to the decision making process of the TASM PLAN. The locations identified in the Top Five Percent for each type of intersection/road segment should be factored into the decision making process of the TASM Plan. Many of the improvements, within the framework of the CTSP, focus on enforcement, education and emergency response. Although the TASM Plan agencies include personnel and process to address these three factors, the end product of the TASM Plan will be maintenance and capital improvements recommendations. Therefore, recommendations for physical improvements should be folded into the development of specific projects. However, the overall safety rating of an intersection or road segment should be reflected in the risk score for those specific assets (roadways and their associated asset types).

Incorporation of the HSIP data can occur at different levels. The first level is the use of the recommendations from this program as part of the TASM Plan implementation process. The second level is additional analysis of the geo-coded crash data. This might take the form of examining the weighted crash frequencies for roadways that are not in the statewide top 5 percent, but may be in the top of the MPO's roadways and/or intersections. A third level would be an independent analysis of the data to meet the objectives of the MPO. For example, the use of the geo-coded crash data might be analyzed specifically with regards to pedestrian or bicyclist safety through examination of just those crash records. This could indicate the need for a bike lane, overpass, or separate bike trail along particular corridors.

X. PILOT PROJECTS

To illustrate the risk assessment process, two roads were selected for a “pilot project”. Those roads were Roadrunner Parkway from Northrise Drive to Sonora Springs, and Missouri Avenue from South Solano Drive to South Telshor Boulevard. Each of these roadways is represented in the GIS data set by numerous segments. The segmentation is generally between intersections.

For Roadrunner Parkway, the length examined is represented by 9 segments. Each segment was scored according to the methodology for likelihood of failure and consequence of failure, and the product of those scores represents the risk score. Table 43 shows the results of the scoring.

Some of the data challenges that were revealed by this pilot study were that no linking field was provided between the GIS road segments and the PCI data. We understand from discussion with the MPO GIS staff that it is possible to link the PCI from the Lucity software to the GIS roads file, but that has not been done to date. Also, no link was provided between the GIS road segments and the traffic model results

For the pilot study, PCI values and traffic counts were manually input to a spreadsheet for calculating scores, and the spreadsheet was joined to the GIS roads file.

Another data challenge related to this exercise is that there was a difference in segmentation noted on Roadrunner between Millennium and Calais. In the GIS data the road is now segmented at Sonora Springs, but in the Lucity data, there is one segment at this location. This is a common type of problem where duplicate data sets exist. This speaks to the need to have a master data set against which all other data is referenced.

The scoring of each roadway segment was calculated based on the values presented earlier in this report. In summary, the higher the points, the more critical the asset.

Risk Score = Likelihood Score X Consequence Scoring

Likelihood – 5 possible points

Consequence – 5 possible points

Total Risk – 25 possible points

From the results shown in Tables 43 and 44, the most critical segment was found to be Roadrunner Parkway, with a risk score of 20. This is the segment between Northrise and

Morning Star Drive, the score for which is influenced by the 2040 ADT. The rest of the road segments examined on Roadrunner received a risk score of 16.

Most of the segments on Missouri received a risk score of 8; however two segments received a score of 16. Those were Missouri between Solano and Pecos, and Missouri between Telshor and Ridgemont Drive.

Table 44 – Risk Scoring for Roadrunner Pkwy from Northrise Dr to Sonora Springs

RD Number	Road Name	Road Class	Length (ft.)	PCI	Likelihood Score	Rd Class Score	Road Class Weight	2040 ADT	Traffic Score	Traffic Score Wt	Risk Score
10	N Roadrunner Pkwy	4	1,293	45	4	4	0.4	21900	4	0.6	16
5767	N Roadrunner Pkwy	4	829	54	4	4	0.4	21900	4	0.6	16
5768	N Roadrunner Pkwy	4	463	56	4	4	0.4	21900	4	0.6	16
5769	N Roadrunner Pkwy	4	458	54	4	4	0.4	21900	4	0.6	16
5770	N Roadrunner Pkwy	4	302	48	4	4	0.4	21900	4	0.6	16
5773	N Roadrunner Pkwy	4	259	40	4	4	0.4	21900	4	0.6	16
5775	N Roadrunner Pkwy	4	541	40	4	4	0.4	21900	4	0.6	16
7742	N Roadrunner Pkwy	4	2,698	36	5	4	0.4	24800	4	0.6	20
8143	N Roadrunner Pkwy	4	1,110	45	4	4	0.4	21900	4	0.6	16

Table 45 – Risk Scoring for Missouri Ave from S. Solano Dr to S. Telshor Blvd.

RD Number	Road Name	Road Class	Length (ft.)	PCI	Likelihood Score	Rd Class Score	Road Class Weight	2040 ADT	Traffic Score	Traffic Score Wt	Risk Score
2392	Missouri Ave	4	284	43	4	4	0.4	21700	4	0.6	16
2407	Missouri Ave	4	459	76	2	4	0.4	21700	4	0.6	8
2586	Missouri Ave	4	655	79	2	4	0.4	21700	4	0.6	8
3059	Missouri Ave	4	252	83	2	4	0.4	21700	4	0.6	8
3061	Missouri Ave	4	251	79	2	4	0.4	21700	4	0.6	8
3075	Missouri Ave	4	515	80	2	4	0.4	21700	4	0.6	8
3143	Missouri Ave	4	276	80	2	4	0.4	21700	4	0.6	8
3160	Missouri Ave	4	536	82	2	4	0.4	22300	4	0.6	8
3163	Missouri Ave	4	771	51	4	4	0.4	22300	4	0.6	16
3209	Missouri Ave	4	501	81	2	4	0.4	21700	4	0.6	8
4991	Missouri Ave	4	280	81	2	4	0.4	25600	4	0.6	8
4992	Missouri Ave	4	489	74	2	4	0.4	26800	4	0.6	8
4998	Missouri Ave	4	601	83	2	4	0.4	25600	4	0.6	8
4999	Missouri Ave	4	220	82	2	4	0.4	21700	4	0.6	8
5029	Missouri Ave	4	649	79	2	4	0.4	21700	4	0.6	8
5030	Missouri Ave	4	396	75	2	4	0.4	33000	4	0.6	8

The results of the risk scoring for the pilot roads are displayed in Figures 10.

The objectives of the TASM Plan includes incorporation of safety data into the decision-making process. Figure 10 displays the crash records from 2010 and 2011, and identifies those records which had a pedestrian or cyclist involved.

For the Roadrunner Parkway pilot segments, there were 17 crashes in the crash data provided for 2010 and 2011. Of those, none were fatal, 3 were injury crashes, and 14 were property only. The injury crashes occurred at the intersections of Northrise Drive and Roadrunner Parkway and Sonora Springs and Roadrunner Parkway. No pedestrian or cyclist involved crashes were reported for the two years examined. The segment south of Northrise had the highest risk score and the safety data emphasizes the criticality of this segment. When improvements are scheduled and designed for this segment, the location should be analyzed for any possible enhancements that would improve the safety of the intersection.

For the Missouri pilot segments, of the 220 total accidents reported for the segments examined in 2010 and 2011, none were fatal, 80 were injury crashes, and 140 were property damage only. The injury accidents occurred at different locations along the stretch examined, with the most occurring at the intersections of Missouri and Telshor Blvd, Missouri and Locust and Missouri and Triviz (I-25). There were several pedestrian and cyclist involved accidents. Missouri Avenue is a Share the Road route, resulting in higher bicycle traffic. There is a school located on the north side of Missouri between Gladys and Boston, leading to increased pedestrian traffic.

In conclusion, the pilot projects provided an opportunity to utilize the data sets and experience the limitations of existing date, represent to the agencies how the data can be used, and illustrate a scoring system which can provide support in the decision-making process.

XI. PUBLIC INVOLVEMENT

This document is intended to be a technical guidance document. Due to its technical nature, the public involvement component of the process was focused on gathering feedback from the MPO Policy Committee, TAC, and the BPAC. These stakeholders have technical expertise in the transportation field and represent participating agencies. The following meetings were attended by BHI, and the content of those meetings is summarized below. Although the public wasn't intentionally targeted for input, all of these meetings (with the exception of the Kick-Off Meeting) are publically advertised and public comments were invited from audience members at each meeting.

Kickoff Meeting – March 7, 2013: The kickoff meeting was attended by representatives of the stakeholder agencies: Mesilla Valley MPO, CLC, DAC, and NMDOT. At that meeting, BHI presented an overview of the project, including the benefits of a TASM Plan, asset management terminology, goals, benefits and objectives. At the workshop, a data survey was distributed, and available asset data was requested.

Technical Advisory Committee Workshop – August 1, 2013: The TAC workshop was held prior to a regularly scheduled meeting of the MPO TAC. At this meeting, BHI discussed what would and would not be included in the TASM Plan, an update was given on the status of data received, and a self-assessment questionnaire was distributed. Example level of service statements were provided in the form of a worksheet for each asset type with space to enter technical and customer level of service statements.

Bicycle and Pedestrian Facilities Advisory Committee – October 15, 2013: BHI presented an overview of the TASM PLAN and its objectives to the BPAC, and provided examples of level of service statements for bike paths, trails, and transit stops. An overview of crash data which is geo-coded by the UNM Division of Governmental Research was provided. Input on level of service statements and performance measures for bicycle and pedestrian facilities was solicited.

Technical Advisory Committee Meeting – November 7, 2013: BHI made a presentation to the TAC at their regularly scheduled meeting. At this meeting, BHI provided an update on the process, and gave examples of level of service statements for each asset type, developed with some input from the process. BHI also discussed the concepts of a risk based approach to asset management, and assigning criticality to assets. To illustrate these concepts, two roads were scored as "pilot" projects. This analysis, for Roadrunner between

Northrise and Sonora Springs, and Missouri Avenue between Solano and Telshor, were presented with criticality scores color-coded on GIS-based maps.

Technical Advisory Committee – April 3 and June 5, 2014: BHI made a presentation to the TAC at both regularly scheduled meetings. The final TASM Plan and associated recommendations were presented to the TAC at the April 3rd meeting. The April 3rd meeting resulted in an opportunity to provide comment at the meeting followed by a 6-week comment period on the draft final TASM Plan. Comments were then addressed and updates presented to the TAC at the June 5th meeting. The TAC approved the final draft of the TASM Plan for review by the MPO Policy Committee on June 5, 2014. The final TASM Plan was presented to the MPO Policy Committee on June 11, 2014.

XII. BENCHMARKS

Benchmarking is the practice of using quantitative measures to compare performance with peers. Benchmarking is a standard component of an asset management practice that allows agencies to measure their performance against other organizations.

Benchmarking can draw attention to best practices for data collection, asset performance, and organizational performance. AASHTO and the Transportation Research Board (TRB) have teamed to create a comparative performance measures program for use by DOTs. This benchmarking program compares all State DOTs anonymously and has created reports on on-time/ on-budget construction, pavement smoothness and safety- fatalities.

Other existing Federal performance measures include the Highway Performance Monitoring System (HPMS), Highway Economic Requirements System (HERS), the NBI and the National Bridge Investment Analysis System (NBIAS). These are aimed at Federal policy and may be difficult to apply to agencies. AASHTO conducted a survey with DOTs in 2009 and found that the following are important in performance-based programs, in order of priority:

- Selecting performance measures
- Establishing national goals
- Relating measures to funding allocation
- Establishing provisions for accountability
- Establishing performance targets
- Determining federal reporting requirements
- Developing data management systems.
- Providing incentives and disincentives.

AASHTO has established the following seven performance management categories:

- Safety
- Preservation
- Operations
- Congestion
- Connectivity
- Economy/Freight
- Environmental

Example performance measures for this plan have been included in the Life Cycle Management sections of this report. It is expected that these performance measures will be refined by each agency as the TASM Plan is implemented to ensure alignment with local goals and objectives as well as state/federal requirements.

XIII. RECOMMENDATIONS

The TASM Plan is a strategic approach to developing an asset management process on a regional basis. This process is a continuum of repeating activities, as represented by the figure below. It is a fluid process which requires constant care to bring true value to the implementing agency.

Figure 11 – Asset Management Process

Like many organizations, the Mesilla Valley MPO conducts activities in each of these areas, but the comprehensive process is not fully developed. The TASM Plan provides guidance on how to establish and sustain an asset management approach by making decisions concerning maintenance, replacement, and expansion of infrastructure in a strategic and regional manner. The Mesilla Valley MPO, with support from the Policy Board and the TAC, can remain as the leader for this effort, but it is expected that as the TASM Plan is implemented a formal leadership group directly associated with asset management may need to be formed.

Asset-specific recommendations have been provided throughout the TASM Plan. More overarching recommendations are discussed below.

A. INVENTORY

As represented in Table 1, data collection efforts initiated under this planning effort have determined that a GIS inventory exists for the following asset types:

- Roadways
- Transit Stops
- Bridges
- Trails

To date, inventory information has not been obtained on the following assets:

- Sidewalks
- Curb and Gutter
- Signs
- Drainage Infrastructure

Recommendation:

- ***Continue to collect as much data as possible, in any format, and start building a GIS inventory that can be accessed and utilized on a regional basis.***

B. VALUATION OF ASSETS

As standard practice, the value of transportation assets is generally available; however, this number is usually represented by replacement value only instead of by a valuation that includes the condition of the asset and integrates life-cycle costs. The estimated remaining life of each asset should be based on comprehensive information known about those assets such as installation date, reported condition, and criticality of use.

Recommendations:

- ***Develop a process to consider the true value of each asset, beyond simple replacement costs.***

C. CONDITION

The CLC pavement management system is the only known asset condition evaluation process for the assets and agencies discussed in the TASM Plan. However, this is a great example of how the process brings value to the decision-making of public funds to maintain the transportation network. A similar process of condition evaluation should be developed for each asset, although the level of effort will vary for each asset and for each agency. The results of this analysis should be incorporated into a regional GIS inventory.

Recommendations:

- ***Each agency should develop a program for regularly inspecting and assessing the condition of assets with estimates on remaining life.***

D. WHAT IMPROVEMENTS ARE NEEDED?

Probably the most important step in asset management is to clearly understand which improvements are needed within the transportation system. Determining what improvements are needed under an asset management framework includes consideration of maintenance activities in conjunction with asset replacement and capital improvements. To reiterate what was discussed previously in this report, preventive maintenance can extend the life of assets. The coordination between maintenance budgets and capital improvement budgets will help build a sustainable asset management process for the region.

Recommendation:

- ***Within and amongst agencies, coordinate review of maintenance budgets with asset replacement and capital improvement budgets.***

E. WHEN ARE IMPROVEMENTS NEEDED?

Understanding when within the life-cycle of each asset it is most beneficial to do maintenance, replacements, or capital improvements is critical to a successful asset management process. Again, this coordination should be done within each agency and amongst all agencies on a regional basis. This type of coordination will bring the most value to the public funds and prevent wasted expenditures of reconstruction of various assets within the same roadway prism. The example provided in Section VII. C. Life Cycle Management-Pavement, clearly represents the dollar value savings when maintenance money is spent wisely at the most appropriate time in the life cycle of an asset.

Recommendations:

- ***Consider when in the lifecycle of the asset to do maintenance, replacement, and capital improvements.***
- ***Coordinate scheduling of asset replacements and capital improvements within the agencies and amongst the agencies.***

F. COSTS AND FINANCING

It is critical to define desired levels of service for each agency and each asset. Then, evaluate the existing levels of service and how much will it cost to maintain that level of service over a specified time frame. Understanding this cost will allow the agency to better develop accurate budget needs and begin to pursue the appropriate amount of funding to effectively maintain their transportation system. Again, doing this individually within each agency as a foundation for decision-making is important, but then coordinating amongst all agencies on a regional basis can bring opportunities to leverage local, state, and federal funding.

Recommendation:

- ***Formalize level of service statements, assess existing level of service, and examine costs to maintain or improve levels of service.***

G. ASSET MANAGEMENT LEADERSHIP TEAM (AMLT)

The creation of an Asset Management Leadership Team (AMLT) will allow for the coordination across multiple organizations and internal departments. The AMLT will encourage buy-in from key leaders and decision-makers. Forming an AMLT requires identifying the agency or department responsible for each asset to be managed and inviting a representative to the table. An effective AMLT is the primary means of identifying needs, management processes, and current practices. Generally, the process begins with engaging all the important stakeholders and management entities in the area and is then followed by establishing the type of data and data collection processes in place. These two steps have been completed and documented as part of the TASM Plan development. In addition, the TASM Plan provides the AMLT with the framework of what type of data needs to be collected, what decisions need to be made for each asset, and how to evaluate assets in order to prioritize expenditures. With the status of the TASM Plan, the newly-formed AMLT can move directly to developing a tiered list of needs based on the team's feedback for each asset. This allows the AMLT to build a sustainable foundation for the asset management process and evaluates issues on a regional basis. One of the most important items an AMLT can address immediately is to decide which agency keeps and maintains the asset data. The ability to have data managed in one unified location is critical. Finally, the AMLT should meet regularly with clear goals which may include a review of current issues, update prioritization lists, coordinate management styles, and work together to effectively implement the TASM Plan. Effort integrated into the AMLT will bring long-term benefit to the TASM Plan for the region.

To provide perspective, a successful AMLT was evaluated, including a phone interview to understand the development process and lessons learned. The following is an overview of the Ohio Department of Transportation (Ohio DOT) AMLT.

The Ohio DOT AMLT has been active since 2010 and has had an effective Leadership team process. It was championed by the Ohio DOT Central Office and District Deputy Directors. It is made up of FHWA, DOT, Council of Governments, Regional Planning Commissions and other local organization representatives with about 35 members, total. It is comprised of Policy level, Executive level, and working professionals in the major business units in both Central and District Offices. It also has some sub-committees. The team provides governance and awareness of its Transportation Asset Management Activities to Ohio DOT. Figure 11 demonstrates the structure of the Teams. The AMLT was the original group of 35 members. The Executive level team is the one that meets regularly to help work on the actual management plan and to discuss the ongoing maintenance of assets. The IT Council is the governing board with the Directors of Transportation and the Assistant Directors of all departments involved. They are the ones to ultimately vote on actions and decisions.

Figure 11 – ODOT Asset Management Leadership Team Structure

During a phone interview with members of the Ohio DOT AMLT, the following ideas were shared:

Team Establishment and Process

The Ohio DOT invited all of the stakeholders involved in the management of assets in the state for their preliminary meetings. They invited stakeholders from the 12 districts, the central office Deputy and Assistant directors, support services (Management, Finance and Planning), FHWA and the state MPOs and ended up with about 75 participants. They conducted a comprehensive survey of the members that resulted in a three tiered list. Afterwards, they asked each organization to identify no more than two representatives to participate in the team. The final AMLT, the Executive Level Team, meets monthly and has about 35 members.

The Ohio DOT created a Plan for Asset Management that had a set of 8 requirements. The first was to get the Plan passed and to get buy-in from leadership. Once that was accomplished, the second step was to establish an AMLT. This was necessary to complete a number of the following steps.

The agencies were selected by the team based on asset management responsibilities, and then the organizations chose whom to send to the AMLT meeting.

Budget

There was really no budget allocated for the creation of the AMLT. The only investment was in staff time from each of the AMLT members.

Tiered Inventory of Assets and Survey

The inventory of assets was taken through an email survey using Survey Monkey and was designed and conducted by the nearby University. The survey results were helpful to help neutralize project importance. Each agency believes that their assets are the most important, so an impartial list helped to objectively prioritize. The results were prioritized based on financial risk, public relations risks and safety risks – all of which were ranked by the associated agency.

H. HOW TO MAKE IT HAPPEN

In order to make the implementation of the TASM Plan a priority, it is recommended that all agencies under the jurisdiction of the Mesilla Valley MPO dedicate an increased amount of funding to the data collection and data base development associated with asset management. The TASM Plan has attempted to note areas where cooperating benefits could occur, as well as low-cost ways to collect and evaluate asset conditions. The results also indicate that this up-front expenditure to implement the TASM Plan will provide financial benefits over time as the future decisions on infrastructure expenditures will be made based on better, more accurate, and truly comprehensive data.

Recommendations:

- ***Form an asset management leadership committee to implement the TASM Plan.***
- ***Determine which agency will manage and maintain the data collected***
- ***Allocate additional funds to the data collection efforts required to implement a comprehensive and regional asset management process.***

APPENDIX A –

DATA SUMMARY

Received from:	Tim Pitts, CLC
Dataset Name	**streets**
Dataset format	lpk

FIELD	EXAMPLE VALUE	Other Possible Values
FID_	9043	
OBJECTID	4189	
RD_Number_	4191	
Date_Added	<Null>	4/23/2009
Added_By		JGE
RD_Name_La	HOLLIDAY PL	
RD_Name_Pr		N, S, E, W
RD_Name_Na	HOLLIDAY	
RD_Name_Ty	PL	CT, AVE, ST, DR, BLVD, WAY, LN
RD_Name_Su		blank
RD_Addr_L_	5015	
RD_Addr_L1	5065	
RD_Addr_R_	5010	
RD_Addr_R1	5060	
RD_NAME_HI		Chamita St (84-232) Note this record is for MESQUITE ST
ZIPCODE_L		
ZIPCODE_R		88007, 88001
RD_Type_Cl	8	values 1 through 11
RD_Type_St	2	almost always 3
RD_Type_Ow	CLC	P, M, S, C
RD_Type_Su		P, G
RD_Type_De	0	2, Striped
RD_Lanes	1	0, 2, 4, 6
RD_Speed	0	15, 35, 45, 65, 75…
RD_Directi		blank
RD_Display	1	
RD_MPO_Loc		blank
Date_Modif	2/28/2013	
Mod_BY	RAW	AJH
RD_Length_	0	many zeros, some values such as .22768
LUCITYLINK	0	14161, many zeros
INLUCITY	0	1
LASTMODBY	JGE	rwright, or blank
LASTMODDAT	11/28/2012	
LASTSYNDAT		11/19/2012
PAVEMENT_C	0	3
Shape_len	741.5218463	varies, all populated

Received from: Sunny

Dataset Name **DACoTRANS**

Dataset format gdb

Contains: DACRR (railroad), Hwy 9, NMGPSRDDAC, Recreation Trails, Roads, US

Roads 12,740 features

Line Feature Class

FIELD	**EXAMPLE VALUE**	**Other Possible Values**
OBJECTID	1	
ST_NAME	CALLE DE POMPEII	
PREFIX		N, S, E, W
NAME	CALLE DE POMPEII	
TYPE		RD, AVE, INERSTATE 25, HIGHWAY 26…
L_F_ADD	2809	
L_T_ADD	2833	
R_F_ADD	2810	
R_T_ADD	2834	
COMAINT	YES	NO
SURFACE	PAVED	GRADE, UNPAVED, blank
CLASS	COUNTY	CITY, PRIVATE, HIGHWAY, INTERSTATE
SPEED	0	25, 30 (lots of zeros)
ROW_WIDTH	50	60, (many blanks)
AADT	0	all zeros
BUILT	YES	many blanks
Enabled	1	all 1
Owner	COUNTY	CITY, STATE, PRIVATE, FEDERAL
Updated	1/29/2010	
Label	CALLE DE POMPEII	
Road_Dist		B, C (many blanks)
Road_Num		077, 049 (many blanks)
DRAWNBY	FCD	many blanks
AltLabel		25, 26, 185 (many blanks)
Shape_Length	775.7186036	varies

Recreation Trails 399 features
Line Feature Class

FIELD	EXAMPLE VALUE	Other Possible Values
OBJECTID_1	1	
OBJECTID	25	
trl_no		all blank
trl_name	Baylor Canyon Trail	Picacho Peak - Trail System
trl_type	2	2 to 9
trl_surf	0	most 0, occasional 1
trl_bmp	0	all zeros
trl_emp	0	all zeros
trl_length	0.61914026	varies, many zeros
trl_width	0	all zeros
FAMMS_NO		all blank
Comments		Originally named SST Trail, sing track bike/hike trail, sing track hike trail ends at A….
Source		7, many blanks
Editor	dbo	
Date_Modif	1/12/2011	
Shape_Length	996.4116578	

Received from:	Tim Pitts, CLC
Dataset Name	**trails**
Dataset format	lpk

FIELD	**EXAMPLE VALUE**	**Other Possible Values**
FID_	0	
OBJECTID	149	
LENGTH	9296.56994	
NAME	Hatch Drain	Leasburg Lateral WW 5, Rincon Drain, Garfield Drain…
DESIGNATIO	NONE	PROPOSED UNPAVED EBID TRAIL
MILES	0	all are zero
PROJECT		Existign Trail (most are blank)
Shape_Leng	9296.569739	varies, all are populated

Received from:	Harold Clark, NMSU
Dataset Name	**DAC_Roads.shp**
Dataset format	shp

FIELD	**EXAMPLE VALUE**	**Other Possible Values**
FID_		522
OBJECTID	1	523
ST_NAME	TWO COUNTIES ROAD	CALLE DE EL PASO
PREFIX		W, N, E, S
NAME	TWO COUNTIES	CALLE DE EL PASO
TYPE	ROAD	DR, CT, RD, BLVD, STREET, LANE, COURT…
L_F_ADD	11	0
L_T_ADD	501	0
R_F_ADD	12	0
R_T_ADD	502	0
COMAINT	YES	NO
SURFACE	PAVED	PAVED
CLASS	COUNTY	HIGHWAY
SPEED	25	0
ROW_WIDTH	40	mostly blank, 50
AADT	0	0
BUILT	YES	blank, NO
Enabled	1	1
Owner	COUNTY	CITY, PRIVATE, STATE, COUNTY, STATE ROAD, blank
Updated		<Null>
len	2666.275937	2682.528493
Shape_Leng	2666.275937	2682.528493

Received from: Tim Pitts
Dataset Name **RoadRUNNER Transit Route and Stops**
Dataset format lpk
Contains: CLC_Bidirectional_Routes, and Route Stops (named by Route)

CLC_Bidirectional_Routes.shp (line shapefile)
All records shown below since this is a small data set

FID_	Name	LENGTH	Direction	Number	Miles
0	Rio Grande Blue	34151.93	clockwise	50	6.468155
1	Cactus Green	30393.81	clockwise	80	5.756391
2	Cactus Green	31127.86	counter	80	5.895417
3	Pecan Brown	38764.29	clockwise	40	7.341706
4	Sun Yellow	36906.06	TO MVM	20	6.98977
5	Sun Yellow	37234.1	TO CTP	20	7.051899
6	Sky Blue	29044.13	TO MVM	60	5.500771
7	Sky Blue	33889.1	TO CTP	60	6.418377
8	Aggie Crimson	31538.15	TO MVM	30	5.973122
9	Aggie Crimson	29951.42	TO CTP	30	5.672606
10	Chile Green	32574.58	clockwise	70	6.169416
11	Chile Green	32504.09	counter	70	6.156065
12	Roadrunner Red	49780.53	counter	90	9.428111
13	Roadrunner Red	47415.48	clockwise	90	8.980186
14	Desert Orange	46539.37	clockwise	10	8.814257
15	Desert Orange	46877.94	counter	10	8.87838
16	Cactus Green	0	counter	80	0
17	DACC Route	0	TO DACC	0	0

Route_10_Stops.shp
A few representative records shown. There are individual files for Route 10, Route 20, Route 30, Route 40&50, Route 60, Route 70, Route 80 and Route 90

FID_	ROUTE_	BENCH	SIDE	RT_DIR	STOP_LOC	TP_ID	Sidewalk	Stp_Numb	Notes	RoadWay	From_	To_	Close_To	Point	Facilities
0	10	N		TO CTP			N	30						0	
1	10	N	MID BLOCK	TO CTP	CHURCH &		Y	31	None	S Church St	E Las Cruce	E Hadley A	US Post Of	1	Sign
2	10	N	FAR SIDE	TO CTP	NORTH MA		N	24	None	N Main St	E Hadley A	E Spruce A	Branidan L	2	Shelter
3	10	N	MID BLOCK	TO CTP	NORTH MA		N	29	None	N Main St	Grenning A	E Fleming A	Complete F	3	Sign
4	10	N	FAR SIDE	TO CTP	NORTH MA		Y	32	None	N Main St	E Cambridg	W Cambrid	Uhal Self S	4	Sign
5	10	N	NEAR SIDE	TO CTP	NORTH MA		Y	33	None	N Main St	W Cambrid	E Madrid A	Dollar Tree	5	Sign
6	10	N	MID BLOCK	TO CTP	NORTH MA		N	27	None	N Main St	E Madrid A	N Solano D	Wellsfargo	6	Sign
7	10	Y	MID BLOCK	TO CTP	NORTH MA		Y	26	None	N Main St	N Solano D	Camino de	Goulf Cour	7	Bench

TP_ID occasionally populated with a value formatted like :10, :20, :50, etc.

	Inventory		Condition	
	Unit	**Quantity**	**Performance Measure**	**Value**
Asset				
Roads				
NMDOT	miles		different based on category and surface type?	
Doña Ana County	miles		anything besides pavement?	
City of Las Cruces	miles		**performance and condition are sometimes independent.**	
Town of Mesilla	miles			
Trails				
Doña Ana County	miles		different based on bike/pedestrian?	
City of Las Cruces	miles			
Transit Stops				
City of Las Cruces			signs, benches, shelters	
Bridges				
NMDOT	each		Sufficiency rating?	
Doña Ana County	each			
City of Las Cruces	each			
Sidewalks				
City of Las Cruces				
Town of Mesilla				
Curb and Gutter				
City of Las Cruces				
Town of Mesilla				

What about traffic signals, lighting, barriers that affect safety?

Asset	Inventory	Condition	What Needed	When Needed	Cost	Financing
Roads						
Trails						
Transit Stops						
Bridges						
Sidewalks						
Curb and Gutter						
Traffic Signals						

	City of Las Cruces				
	Inventory		Condition		Comments
Asset	**data exists?**	**data received?**	**Data exists?**	**Data received?**	
Roads	yes	yes	yes	yes	Pavement Management system report received containing pavement condition info
Trails	yes	yes	unknown	no	
Transit Stops	yes	yes	unknown	no	
Bridges	unknown	no	unknown	no	
Sidewalks	unko	no	unknown	no	
Curb and Gutter	unknown	no	unknown	no	
Traffic Signals	yes	no	unknown	no	data reported from survey
Lighting	yes	no	unknown	no	data reported from survey
Barriers	unknown	no	unknown	no	

Doña Ana County				
Inventory		**Condition**		**Comments**
data exists?	**data received?**	**Data exists?**	**Data received?**	
yes	yes	yes	yes	shapefile of roads slightly different from CLC roads
yes	yes	unknown	no	
no	no	NA	NA	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

NMDOT				
Inventory		Condition		Comments
data exists?	**data received?**	**Data exists?**	**Data received?**	
yes	yes	yes	yes	
NA	no	NA	NA	
NA	yes	NA	NA	
yes	no	unknown	no	available from National Bridge Inver
NA	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

Town of Mesilla				
Inventory		**Condition**		**Comments**
data exists?	**data received?**	**Data exists?**	**Data received?**	
yes	yes	yes	yes	paper map of roads received.
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

Received from: Robert Young, NMDOT

Dataset Name **2012 Pavement Distress Data - Dona Ana County**

Dataset format .xls

Contains: the following is a sample data set

Route	Direction	Beginning Mile Point	Ending Mile Point	Section Length	Functional Class	NMDOT Maintenance	PSI	IRI	RQI
FL6303	M	0.000	0.225	0.225	PRINCIPAL ARTERIALS	1	4.02	98	3.30
FL6303	P	0.000	0.225	0.225	PRINCIPAL ARTERIALS	1	2.77	195	2.20
I00010	M	0.035	3.630	3.595	INTERSTATE SYSTEM	1	4.35	48	4.10
I00010	M	3.630	3.830	0.200	INTERSTATE SYSTEM	1	4.55	57	4.00
I00010	M	3.830	5.642	1.812	INTERSTATE SYSTEM	1	3.82	57	4.00
I00010	M	5.642	5.730	0.088	INTERSTATE SYSTEM	1	4.32	75	3.70
I00010	M	5.730	5.800	0.070	INTERSTATE SYSTEM	1	3.79	116	3.10

NMDOT				
Inventory		**Condition**		**Comments**
data exists?	**data received?**	**Data exists?**	**Data received?**	
yes	yes	yes	yes	
NA	no	NA	NA	
NA	yes	NA	NA	
yes	no	unknown	no	available from National Bridge Inver
NA	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

Town of Mesilla				
Inventory		Condition		Comments
data exists?	data received?	Data exists?	Data received?	
yes	yes	yes	yes	paper map of roads received.
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
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NMDOT				
Inventory		**Condition**		**Comments**
data exists?	**data received?**	**Data exists?**	**Data received?**	
yes	yes	yes	yes	
NA	no	NA	NA	
NA	yes	NA	NA	
yes	no	unknown	no	available from National Bridge Inver
NA	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

Town of Mesilla				
Inventory		Condition		Comments
data exists?	data received?	Data exists?	Data received?	
yes	yes	yes	yes	paper map of roads received.
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

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I00010	M	3.630	3.830	0.200	INTERSTATE SYSTEM	1	4.55	57	4.00
I00010	M	3.830	5.642	1.812	INTERSTATE SYSTEM	1	3.82	57	4.00
I00010	M	5.642	5.730	0.088	INTERSTATE SYSTEM	1	4.32	75	3.70
I00010	M	5.730	5.800	0.070	INTERSTATE SYSTEM	1	3.79	116	3.10

Agency	Asset Type	Format	includes	gaps
City of Las Cruces				
	DA County Roads	GIS	road centerline	
	Trails	GIS		surface type included in
	Transit Stops	GIS	facilities at stops	
	Transit Routes	GIS	length, route #	
Doña Ana County				
	DA County Roads	GIS	surface, field for ROW width	ROW width many times not populated
	Trails	GIS	name, type, surface	need data dictionary
NMDOT				
	Roads	GIS		
	Crash Data	GIS	point file of crash locations with attributes	link to GIS roadway segment
Town of Mesilla				
	Map of Roads	paper		
NMSU				
	DA County Roads	GIS	road centerline	

NBI SELECTED FIELDS AND VALUES FOR BRIDGES WITHIN THE MESILLA VALLEY MPO

ITEM8	ITEM5C	ITEM6A	ITEM21 (Maintenance Responsibility)	ITEM22 (Owner)	ITEM26 (Functional Class of Inventory	ITEM27 (Yr Built)	ITEM29 (ADT)	ITEM30 (Yr of ADT)	ITEM94 (Bridge Improvement Cost in $1,000s)	ITEM95 (Roadway Improvement Cost)	ITEM96 (Total Project Cost)	ITEM97 (Yr of Improvement Cost)	NM12_txt_STATUS	NM12_txt_SUFFICIENCY_RATING
578	1	DRAINAGE DITCH	2	2	9	1951	509	2011	67	6	100	2030	1	29.7
2730	1	IRRIGATION CANAL	1	1	17	1934	3386	2011	44	4	66	2008	1	35.7
2814	1	IRRIGATION CANAL	1	1	8	1972	948	2011	22	2	34	2008	1	38.4
2388	1	IRRIGATION CANAL	1	1	7	1923	5574	2011	33	3	50	2008	1	41.3
7714	1	LEASBURG CANAL	2	2	9	1940	509	2011	25	2	38	2030	2	44.6
7700	1	THREE SAINTS MAIN CANAL	2	2	9	1972	509	2011	27	2	41	2030	2	45.5
7703	1	IRRIGATION CANAL	2	2	9	1940	823	2011	21	2	32	2030	1	49
7707	1	IRRIGATION CANAL	2	2	9	1938	823	2011	104	10	156	2030	0	59.6
5295	1	WESTSIDE CANAL	1	1	17	1954	2392	2011	94	9	141	2008	2	61.4
7173	1	NM-292	1	1	11	1971	14698	2011	506	50	760	2030	1	62.4
2368	1	DEL RIO DRAIN	1	1	8	1945	251	2011	38	3	57	2008	2	65.5
5723	1	ALAMEDA ARROYO	1	1	14	1957	10978	2011	316	31	474	2008	2	66.4
5724	1	ALAMEDA ARROYO	1	1	14	1957	9572	2011	316	31	474	2008	2	66.6
2969	1	UNNAMED WATERWAY	1	1	14	1933	44091	2011					0	66.9
6827	1	Interstate Ramps	1	1	11	1968	14971	2011	569	56	854	2030	1	68
6828	1	Interstate Ramps	1	1	11	1968	13720	2011	569	56	854	2030	1	68
6272	1	Leasburg Canal	1	1	7	1962	1320	2011					0	68.3
6336	1	UNNAMED WATERWAY	1	1	1	1961	15112	2011	77	8	90	2008	1	68.9
4551	1	RIO GRANDE	2	1	7	1941	2294	2011	558	55	837	2008	2	69.2
6183	1	SANDHILL ARROYO	1	1	11	1961	16676	2011					0	69.8
7174	1	NM-292	1	1	11	1971	16206	2011	398	39	597	2030	1	70
7258	1	NM-28(Ave. De. Mesilla	1	1	11	1971	11150	2011	462	46	694	2030	1	70
7259	1	NM-28(Ave. De Mesilla)	1	1	11	1971	11195	2011	200	100	350	2030	1	70
4283	1	RIO GRANDE	2	2	8	1941	948	2011	544	54	816	2008	2	70.1
4263	1	RIO GRANDE	2	2	9	1941	818	2011	483	48	725	2008	2	70.7
7709	1	LAS CRUCES LATERAL	2	2	9	1944	797	2011	16	1	25	2030	2	70.8
7713	1	LEASBURG CANAL	2	2	9	1941	823	2011	36	3	55	2030	0	74.7
5584	1	LEASBURG CANAL	1	1	2	1933	20108	2011	47	4	70	2008	0	74.8
3243	1	LEASBURG CANAL	2	2	9	1930	509	2011	252	25	294	2008	0	77.5
6343	1	LAS CRUCES ARROYO	4	4	14	1962	26170	2011					0	77.5
6668	1	I-25 NB and SB	1	1	7	1966	1382	2011	5000	5000	11000	2020	1	77.8
6734	1	LOCAL ROAD	1	1	1	1966	8693	2011	193	19	289	2030	2	78
6194	1	UNNAMED WATERWAY	1	1	11	1960	40094	2011					0	78.4
2593	1	UNNAMED WATERWAY	1	1	7	1932	607	2011					0	78.7
2966	1	UNNAMED WATERWAY	1	1	7	1932	607	2011	195	19	293	2008	0	78.7
9174	1	ROADRUNNER PARKWAY	1	1	14	2003	44091	2011					0	78.8
6187	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	79
6239	1	I-10 EBL/WBL	1	1	8	1961	150	2011	200	25	300	2030	1	79
6732	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	79
9218	1	Brahman Road	1	1	2	2003	5226	2011					0	79
5769	1	UNNAMED WATERWAY	1	1	1	1955	34333	2011					0	79.1
7701	1	IRRIGATION CANAL	2	2	9	1974	509	2011	33	3	50	2030	0	79.7
6189	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	80
9355	1	UNNAMED WATERWAY	1	1	2	2003	9934	2011					0	80
9173	1	DEL REY BOULAVARD	1	1	14	2002	17544	2011					0	80.8
6045	1	UNNAMED WATERWAY	1	1	1	1958	34333	2011	409	40	614	2030	2	81
7636	1	SOUTHERN CANAL	4	4	17	1975	3373	2011	68	7	101	2020	0	81.6
5661	1	UNNAMED WATERWAY	1	1	2	1954	10551	2011					0	81.8
6190	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6191	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6192	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6733	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6735	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	82
6736	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	82
6825	1	Missouri Avenue	1	1	11	1968	18668	2011					2	82
6973	1	UNNAMED WATERWAY	1	1	11	1968	8420	2011					0	82
6975	1	UNNAMED WATERWAY	1	1	11	1968	8420	2011					0	82
9266	1	NM-101, NM-478, BNSF R/R	1	1	1	2004	607	2011					0	82
6737	1	UNNAMED WATERWAY	1	1	1	1966	7890	2011					0	82.1

6184	1	UNNAMED WATERWAY	1	1	1	1961	16676	2011					0	83
6826	1	Missouri Avenue	1	1	11	1968	18999	2011					2	83
7264	1	IG 1142 Ramp 'E'	1	1	11	1971	10007	2011					1	83
5583	1	IRRIGATION CANAL	1	1	2	1933	4858	2011					0	83.8
6829	1	Cholla Road	1	1	11	1968	3980	2011					0	84
6830	1	Cholla Road	1	1	11	1968	4440	2011					0	84
5294	1	LEASBURG CANAL	2	2	9	1954	509	2011	76	7	114	2008	0	84.1
8761	1	WEST SIDE CANAL	2	2	9	1989	823	2011	34	3	52	2030	0	84.9
8182	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8189	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8818	1	RIO GRANDE	1	1	14	1992	13375	2011					0	86.1
7710	1	LEASBURG CANAL	2	2	9	1940	509	2011					0	86.3
7712	1	LEASBURG CANAL	2	2	9	1941	509	2011					0	86.3
6834	1	Fillmore Arroyo	1	1	1	1968	16533	2011					0	87
6835	1	Fillmore Arroyo	1	1	1	1968	15947	2011					0	87
7706	1	EAST SIDE CANAL	2	2	9	1956	823	2011					0	87.9
7266	1	UNION AVENUE	1	1	11	1971	10007	2011					1	88
3249	1	IRRIGATION CANAL	1	1	7	1933	2194	2011	14	1	16	2008	0	88.2
7270	8	TORTUGAS ARROYO	1	1	17	1972	90	2011					0	89
7723	1	LEASBURG CANAL	2	2	9	1974	509	2011					0	90.8
9104	1	Wells-Geothermal Drive	1	1	11	2001	8420	2011					0	91
6662	1	I-10 EB/WB	1	1	14	1966	4186	2011	621	62	932	2030	0	91.6
9265	1	TRIVIZ DRIVE	1	1	14	2003	34906	2011					0	92.4
9210	1	MESA GRANDE DRIVE	1	1	14	2003	21197	2011					0	93
9103	1	Spruce Street	1	1	11	2001	40094	2011					0	93.2
6134	1	I-25 NBL/SBL	1	1	14	1960	17544	2011	515	51	772	2030	2	94
7267	1	UNION AVENUE	1	1	11	1971	8524	2011					1	94
9450	1	DRIPPING SPRINGS TORTUGA	2	2	16	2008	2729	2011					0	94
8181	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	94.1
7705	1	EAST SIDE CANAL	2	2	9	1956	509	2011					0	94.2
6831	1	Cholla Road	1	1	11	1968	10007	2011					0	95
7265	1	Ramp E of I-10	1	1	11	1971	8524	2011					1	95
9211	1	MESA GRANDE DRIVE	1	1	14	2003	22894	2011					0	95
9236	1	NASA Road	1	1	2	2003	5226	2011					0	95
9237	1	NASA Road	1	1	2	2003	4708	2011					0	95
6832	1	Cholla Road	1	1	11	1968	8524	2011					0	96
6726	1	UNNAMED WATERWAY	1	1	1	1966	20559	2011					0	96.1
5771	1	UNNAMED WATERWAY	1	1	1	1955	17163	2011					0	96.4
6339	1	UNNAMED WATERWAY	1	1	1	1961	17170	2011					0	96.4
8752	1	RIO GRANDE	1	1	17	1989	3386	2011					0	96.4
10089	1	UNNAMED WATERWAY	1	1	8	1993	823	2011					0	96.4
6969	8	UNNAMED WATERWAY	1	1	17	1968	5055	2011					0	96.5
6971	1	UNNAMED WATERWAY	1	1	1	1968	16533	2011					0	96.5
6972	1	UNNAMED WATERWAY	1	1	1	1968	15947	2011					0	96.5
5772	1	UNNAMED WATERWAY	1	1	1	1955	14456	2011					0	96.6
6337	1	UNNAMED WATERWAY	1	1	1	1961	15112	2011					0	96.6
6338	1	UNNAMED WATERWAY	1	1	1	1961	14456	2011					0	96.6
6974	8	UNNAMED WWAY I25 MP142.7	1	1	9	1968	509	2011					0	96.8
7260	1	Boutz Street	1	1	11	1971	11150	2011					0	97
7261	1	Boutz Street	1	1	11	1971	11195	2011					0	97
9206	1	Rinconada Road	1	1	14	2003	21197	2011					0	97
9207	1	Rinconada Road	1	1	14	2003	22894	2011					0	97
9208	1	Sonoma Ranch Road	1	1	14	2003	21197	2011					0	97
9209	1	Sonoma Ranch Road	1	1	14	2004	22894	2011					0	97
9212	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9213	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9214	1	Holman Road / Dunn Drive	1	1	14	2003	11258	2011					0	97
9215	1	Hollman Road / Dunn Driv	1	1	14	2007	11385	2011					0	97
9216	1	Weisner Road	1	1	2	2007	5226	2011					0	97
9217	1	Weisner Road	1	1	2	2003	4708	2011					0	97
9219	1	Brahman Road	1	1	2	2003	4708	2011					0	97
8765	1	RIO GRANDE	1	1	7	1992	1076	2011					0	97.4
6833	8	FILLMORE ARROYO	1	1	17	1968	5136	2012					0	97.5
9151	1	I-25 SBL ON RAMP	1	1	14	2002	17544	2011					0	97.5

NMDOT				
Inventory		Condition		Comments
data exists?	data received?	Data exists?	Data received?	
yes	yes	yes	yes	
NA	no	NA	NA	
NA	yes	NA	NA	
yes	no	unknown	no	available from National Bridge Inver
NA	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

Town of Mesilla				
Inventory		Condition		Comments
data exists?	data received?	Data exists?	Data received?	
yes	yes	yes	yes	paper map of roads received.
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

Received from: Robert Young, NMDOT

Dataset Name **2012 Pavement Distress Data - Dona Ana County**

Dataset format .xls

Contains: the following is a sample data set

Route	Direction	Beginning Mile Point	Ending Mile Point	Section Length	Functional Class	NMDOT Maintenance	PSI	IRI	RQI
FL6303	M	0.000	0.225	0.225	PRINCIPAL ARTERIALS	1	4.02	98	3.30
FL6303	P	0.000	0.225	0.225	PRINCIPAL ARTERIALS	1	2.77	195	2.20
I00010	M	0.035	3.630	3.595	INTERSTATE SYSTEM	1	4.35	48	4.10
I00010	M	3.630	3.830	0.200	INTERSTATE SYSTEM	1	4.55	57	4.00
I00010	M	3.830	5.642	1.812	INTERSTATE SYSTEM	1	3.82	57	4.00
I00010	M	5.642	5.730	0.088	INTERSTATE SYSTEM	1	4.32	75	3.70
I00010	M	5.730	5.800	0.070	INTERSTATE SYSTEM	1	3.79	116	3.10

NMDOT				
Inventory		Condition		Comments
data exists?	data received?	Data exists?	Data received?	
yes	yes	yes	yes	
NA	no	NA	NA	
NA	yes	NA	NA	
yes	no	unknown	no	available from National Bridge Inver
NA	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

Town of Mesilla				
Inventory		**Condition**		**Comments**
data exists?	**data received?**	**Data exists?**	**Data received?**	
yes	yes	yes	yes	paper map of roads received.
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	
unknown	no	unknown	no	

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Dataset Name **2012 Pavement Distress Data - Dona Ana County**

Dataset format .xls

Contains: the following is a sample data set

Route	Direction	Beginning Mile Point	Ending Mile Point	Section Length	Functional Class	NMDOT Maintenance	PSI	IRI	RQI
FL6303	M	0.000	0.225	0.225	PRINCIPAL ARTERIALS	1	4.02	98	3.30
FL6303	P	0.000	0.225	0.225	PRINCIPAL ARTERIALS	1	2.77	195	2.20
I00010	M	0.035	3.630	3.595	INTERSTATE SYSTEM	1	4.35	48	4.10
I00010	M	3.630	3.830	0.200	INTERSTATE SYSTEM	1	4.55	57	4.00
I00010	M	3.830	5.642	1.812	INTERSTATE SYSTEM	1	3.82	57	4.00
I00010	M	5.642	5.730	0.088	INTERSTATE SYSTEM	1	4.32	75	3.70
I00010	M	5.730	5.800	0.070	INTERSTATE SYSTEM	1	3.79	116	3.10

Agency	Asset Type	Format	includes	gaps
City of Las Cruces				
	DA County Roads	GIS	road centerline	
	Trails	GIS		surface type included in
	Transit Stops	GIS	facilities at stops	
	Transit Routes	GIS	length, route #	
Doña Ana County				
	DA County Roads	GIS	surface, field for ROW width	ROW width many times not populated
	Trails	GIS	name, type, surface	need data dictionary
NMDOT				
	Roads	GIS		
	Crash Data	GIS	point file of crash locations with attributes	link to GIS roadway segment
Town of Mesilla				
	Map of Roads	paper		
NMSU				
	DA County Roads	GIS	road centerline	

NBI SELECTED FIELDS AND VALUES FOR BRIDGES WITHIN THE MESILLA VALLEY MPO

ITEM8	ITEM5C	ITEM6A	ITEM21 (Maintenance Responsibility)	ITEM22 (Owner)	ITEM26 (Functional Class of Inventory	ITEM27 (Yr Built)	ITEM29 (ADT)	ITEM30 (Yr of ADT)	ITEM94 (Bridge Improvement Cost in $1,000s)	ITEM95 (Roadway Improvement Cost)	ITEM96 (Total Project Cost)	ITEM97 (Yr of Improvement Cost)	NM12_txt_STATUS	NM12_txt_SUFFICIENCY_RATING
578	1	DRAINAGE DITCH	2	2	9	1951	509	2011	67	6	100	2030	1	29.7
2730	1	IRRIGATION CANAL	1	1	17	1934	3386	2011	44	4	66	2008	1	35.7
2814	1	IRRIGATION CANAL	1	1	8	1972	948	2011	22	2	34	2008	1	38.4
2388	1	IRRIGATION CANAL	1	1	7	1923	5574	2011	33	3	50	2008	1	41.3
7714	1	LEASBURG CANAL	2	2	9	1940	509	2011	25	2	38	2030	2	44.6
7700	1	THREE SAINTS MAIN CANAL	2	2	9	1972	509	2011	27	2	41	2030	2	45.5
7703	1	IRRIGATION CANAL	2	2	9	1940	823	2011	21	2	32	2030	1	49
7707	1	IRRIGATION CANAL	2	2	9	1938	823	2011	104	10	156	2030	0	59.6
5295	1	WESTSIDE CANAL	1	1	17	1954	2392	2011	94	9	141	2008	2	61.4
7173	1	NM-292	1	1	11	1971	14698	2011	506	50	760	2030	1	62.4
2368	1	DEL RIO DRAIN	1	1	8	1945	251	2011	38	3	57	2008	2	65.5
5723	1	ALAMEDA ARROYO	1	1	14	1957	10978	2011	316	31	474	2008	2	66.4
5724	1	ALAMEDA ARROYO	1	1	14	1957	9572	2011	316	31	474	2008	2	66.6
2969	1	UNNAMED WATERWAY	1	1	14	1933	44091	2011					0	66.9
6827	1	Interstate Ramps	1	1	11	1968	14971	2011	569	56	854	2030	1	68
6828	1	Interstate Ramps	1	1	11	1968	13720	2011	569	56	854	2030	1	68
6272	1	Leasburg Canal	1	1	7	1962	1320	2011					0	68.3
6336	1	UNNAMED WATERWAY	1	1	1	1961	15112	2011	77	8	90	2008	1	68.9
4551	1	RIO GRANDE	2	1	7	1941	2294	2011	558	55	837	2008	2	69.2
6183	1	SANDHILL ARROYO	1	1	11	1961	16676	2011					0	69.8
7174	1	NM-292	1	1	11	1971	16206	2011	398	39	597	2030	1	70
7258	1	NM-28(Ave. De. Mesilla	1	1	11	1971	11150	2011	462	46	694	2030	1	70
7259	1	NM-28(Ave. De Mesilla)	1	1	11	1971	11195	2011	200	100	350	2030	1	70
4283	1	RIO GRANDE	2	2	8	1941	948	2011	544	54	816	2008	2	70.1
4263	1	RIO GRANDE	2	2	9	1941	818	2011	483	48	725	2008	2	70.7
7709	1	LAS CRUCES LATERAL	2	2	9	1944	797	2011	16	1	25	2030	2	70.8
7713	1	LEASBURG CANAL	2	2	9	1941	823	2011	36	3	55	2030	0	74.7
5584	1	LEASBURG CANAL	1	1	2	1933	20108	2011	47	4	70	2008	0	74.8
3243	1	LEASBURG CANAL	2	2	9	1930	509	2011	252	25	294	2008	0	77.5
6343	1	LAS CRUCES ARROYO	4	4	14	1962	26170	2011					0	77.5
6668	1	I-25 NB and SB	1	1	7	1966	1382	2011	5000	5000	11000	2020	1	77.8
6734	1	LOCAL ROAD	1	1	1	1966	8693	2011	193	19	289	2030	2	78
6194	1	UNNAMED WATERWAY	1	1	11	1960	40094	2011					0	78.4
2593	1	UNNAMED WATERWAY	1	1	7	1932	607	2011					0	78.7
2966	1	UNNAMED WATERWAY	1	1	7	1932	607	2011	195	19	293	2008	0	78.7
9174	1	ROADRUNNER PARKWAY	1	1	14	2003	44091	2011					0	78.8
6187	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	79
6239	1	I-10 EBL/WBL	1	1	8	1961	150	2011	200	25	300	2030	1	79
6732	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	79
9218	1	Brahman Road	1	1	2	2003	5226	2011					0	79
5769	1	UNNAMED WATERWAY	1	1	1	1955	34333	2011					0	79.1
7701	1	IRRIGATION CANAL	2	2	9	1974	509	2011	33	3	50	2030	0	79.7
6189	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	80
9355	1	UNNAMED WATERWAY	1	1	2	2003	9934	2011					0	80
9173	1	DEL REY BOULAVARD	1	1	14	2002	17544	2011					0	80.8
6045	1	UNNAMED WATERWAY	1	1	1	1958	34333	2011	409	40	614	2030	2	81
7636	1	SOUTHERN CANAL	4	4	17	1975	3373	2011	68	7	101	2020	0	81.6
5661	1	UNNAMED WATERWAY	1	1	2	1954	10551	2011					0	81.8
6190	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6191	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6192	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6733	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6735	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	82
6736	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	82
6825	1	Missouri Avenue	1	1	11	1968	18668	2011					2	82
6973	1	UNNAMED WATERWAY	1	1	11	1968	8420	2011					0	82
6975	1	UNNAMED WATERWAY	1	1	11	1968	8420	2011					0	82
9266	1	NM-101, NM-478, BNSF R/R	1	1	1	2004	607	2011					0	82
6737	1	UNNAMED WATERWAY	1	1	1	1966	7890	2011					0	82.1

Agency	Asset Type	Format	includes	gaps
City of Las Cruces				
	DA County Roads	GIS	road centerline	
	Trails	GIS		surface type included in
	Transit Stops	GIS	facilities at stops	
	Transit Routes	GIS	length, route #	
Doña Ana County				
	DA County Roads	GIS	surface, field for ROW width	ROW width many times not populated
	Trails	GIS	name, type, surface	need data dictionary
NMDOT				
	Roads	GIS		
	Crash Data	GIS	point file of crash locations with attributes	link to GIS roadway segment
Town of Mesilla				
	Map of Roads	paper		
NMSU				
	DA County Roads	GIS	road centerline	

NBI SELECTED FIELDS AND VALUES FOR BRIDGES WITHIN THE MESILLA VALLEY MPO

ITEM8	ITEM5C	ITEM6A	ITEM21 (Maintenance Responsibility)	ITEM22 (Owner)	ITEM26 (Functional Class of Inventory	ITEM27 (Yr Built)	ITEM29 (ADT)	ITEM30 (Yr of ADT)	ITEM94 (Bridge Improvement Cost in $1,000s)	ITEM95 (Roadway Improvement Cost)	ITEM96 (Total Project Cost)	ITEM97 (Yr of Improvement Cost)	NM12_txt_STATUS	NM12_txt_SUFFICIENCY_RATING
578	1	DRAINAGE DITCH	2	2	9	1951	509	2011	67	6	100	2030	1	29.7
2730	1	IRRIGATION CANAL	1	1	17	1934	3386	2011	44	4	66	2008	1	35.7
2814	1	IRRIGATION CANAL	1	1	8	1972	948	2011	22	2	34	2008	1	38.4
2388	1	IRRIGATION CANAL	1	1	7	1923	5574	2011	33	3	50	2008	1	41.3
7714	1	LEASBURG CANAL	2	2	9	1940	509	2011	25	2	38	2030	2	44.6
7700	1	THREE SAINTS MAIN CANAL	2	2	9	1972	509	2011	27	2	41	2030	2	45.5
7703	1	IRRIGATION CANAL	2	2	9	1940	823	2011	21	2	32	2030	1	49
7707	1	IRRIGATION CANAL	2	2	9	1938	823	2011	104	10	156	2030	0	59.6
5295	1	WESTSIDE CANAL	1	1	17	1954	2392	2011	94	9	141	2008	2	61.4
7173	1	NM-292	1	1	11	1971	14698	2011	506	50	760	2030	1	62.4
2368	1	DEL RIO DRAIN	1	1	8	1945	251	2011	38	3	57	2008	2	65.5
5723	1	ALAMEDA ARROYO	1	1	14	1957	10978	2011	316	31	474	2008	2	66.4
5724	1	ALAMEDA ARROYO	1	1	14	1957	9572	2011	316	31	474	2008	2	66.6
2969	1	UNNAMED WATERWAY	1	1	14	1933	44091	2011					0	66.9
6827	1	Interstate Ramps	1	1	11	1968	14971	2011	569	56	854	2030	1	68
6828	1	Interstate Ramps	1	1	11	1968	13720	2011	569	56	854	2030	1	68
6272	1	Leasburg Canal	1	1	7	1962	1320	2011					0	68.3
6336	1	UNNAMED WATERWAY	1	1	1	1961	15112	2011	77	8	90	2008	1	68.9
4551	1	RIO GRANDE	2	1	7	1941	2294	2011	558	55	837	2008	2	69.2
6183	1	SANDHILL ARROYO	1	1	11	1961	16676	2011					0	69.8
7174	1	NM-292	1	1	11	1971	16206	2011	398	39	597	2030	1	70
7258	1	NM-28(Ave. De. Mesilla	1	1	11	1971	11150	2011	462	46	694	2030	1	70
7259	1	NM-28(Ave. De Mesilla)	1	1	11	1971	11195	2011	200	100	350	2030	1	70
4283	1	RIO GRANDE	2	2	8	1941	948	2011	544	54	816	2008	2	70.1
4263	1	RIO GRANDE	2	2	9	1941	818	2011	483	48	725	2008	2	70.7
7709	1	LAS CRUCES LATERAL	2	2	9	1944	797	2011	16	1	25	2030	2	70.8
7713	1	LEASBURG CANAL	2	2	9	1941	823	2011	36	3	55	2030	0	74.7
5584	1	LEASBURG CANAL	1	1	2	1933	20108	2011	47	4	70	2008	0	74.8
3243	1	LEASBURG CANAL	2	2	9	1930	509	2011	252	25	294	2008	0	77.5
6343	1	LAS CRUCES ARROYO	4	4	14	1962	26170	2011					0	77.5
6668	1	I-25 NB and SB	1	1	7	1966	1382	2011	5000	5000	11000	2020	1	77.8
6734	1	LOCAL ROAD	1	1	1	1966	8693	2011	193	19	289	2030	2	78
6194	1	UNNAMED WATERWAY	1	1	11	1960	40094	2011					0	78.4
2593	1	UNNAMED WATERWAY	1	1	7	1932	607	2011					0	78.7
2966	1	UNNAMED WATERWAY	1	1	7	1932	607	2011	195	19	293	2008	0	78.7
9174	1	ROADRUNNER PARKWAY	1	1	14	2003	44091	2011					0	78.8
6187	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	79
6239	1	I-10 EBL/WBL	1	1	8	1961	150	2011	200	25	300	2030	1	79
6732	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	79
9218	1	Brahman Road	1	1	2	2003	5226	2011					0	79
5769	1	UNNAMED WATERWAY	1	1	1	1955	34333	2011					0	79.1
7701	1	IRRIGATION CANAL	2	2	9	1974	509	2011	33	3	50	2030	0	79.7
6189	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	80
9355	1	UNNAMED WATERWAY	1	1	2	2003	9934	2011					0	80
9173	1	DEL REY BOULAVARD	1	1	14	2002	17544	2011					0	80.8
6045	1	UNNAMED WATERWAY	1	1	1	1958	34333	2011	409	40	614	2030	2	81
7636	1	SOUTHERN CANAL	4	4	17	1975	3373	2011	68	7	101	2020	0	81.6
5661	1	UNNAMED WATERWAY	1	1	2	1954	10551	2011					0	81.8
6190	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6191	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6192	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6733	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6735	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	82
6736	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	82
6825	1	Missouri Avenue	1	1	11	1968	18668	2011					2	82
6973	1	UNNAMED WATERWAY	1	1	11	1968	8420	2011					0	82
6975	1	UNNAMED WATERWAY	1	1	11	1968	8420	2011					0	82
9266	1	NM-101, NM-478, BNSF R/R	1	1	1	2004	607	2011					0	82
6737	1	UNNAMED WATERWAY	1	1	1	1966	7890	2011					0	82.1

6184	1	UNNAMED WATERWAY	1	1	1	1961	16676	2011					0	83
6826	1	Missouri Avenue	1	1	11	1968	18999	2011					2	83
7264	1	IG 1142 Ramp 'E'	1	1	11	1971	10007	2011					1	83
5583	1	IRRIGATION CANAL	1	1	2	1933	4858	2011					0	83.8
6829	1	Cholla Road	1	1	11	1968	3980	2011					0	84
6830	1	Cholla Road	1	1	11	1968	4440	2011					0	84
5294	1	LEASBURG CANAL	2	2	9	1954	509	2011	76	7	114	2008	0	84.1
8761	1	WEST SIDE CANAL	2	2	9	1989	823	2011	34	3	52	2030	0	84.9
8182	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8189	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8818	1	RIO GRANDE	1	1	14	1992	13375	2011					0	86.1
7710	1	LEASBURG CANAL	2	2	9	1940	509	2011					0	86.3
7712	1	LEASBURG CANAL	2	2	9	1941	509	2011					0	86.3
6834	1	Fillmore Arroyo	1	1	1	1968	16533	2011					0	87
6835	1	Fillmore Arroyo	1	1	1	1968	15947	2011					0	87
7706	1	EAST SIDE CANAL	2	2	9	1956	823	2011					0	87.9
7266	1	UNION AVENUE	1	1	11	1971	10007	2011					1	88
3249	1	IRRIGATION CANAL	1	1	7	1933	2194	2011	14	1	16	2008	0	88.2
7270	8	TORTUGAS ARROYO	1	1	17	1972	90	2011					0	89
7723	1	LEASBURG CANAL	2	2	9	1974	509	2011					0	90.8
9104	1	Wells-Geothermal Drive	1	1	11	2001	8420	2011					0	91
6662	1	I-10 EB/WB	1	1	14	1966	4186	2011	621	62	932	2030	0	91.6
9265	1	TRIVIZ DRIVE	1	1	14	2003	34906	2011					0	92.4
9210	1	MESA GRANDE DRIVE	1	1	14	2003	21197	2011					0	93
9103	1	Spruce Street	1	1	11	2001	40094	2011					0	93.2
6134	1	I-25 NBL/SBL	1	1	14	1960	17544	2011	515	51	772	2030	2	94
7267	1	UNION AVENUE	1	1	11	1971	8524	2011					1	94
9450	1	DRIPPING SPRINGS TORTUGA	2	2	16	2008	2729	2011					0	94
8181	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	94.1
7705	1	EAST SIDE CANAL	2	2	9	1956	509	2011					0	94.2
6831	1	Cholla Road	1	1	11	1968	10007	2011					0	95
7265	1	Ramp E of I-10	1	1	11	1971	8524	2011					1	95
9211	1	MESA GRANDE DRIVE	1	1	14	2003	22894	2011					0	95
9236	1	NASA Road	1	1	2	2003	5226	2011					0	95
9237	1	NASA Road	1	1	2	2003	4708	2011					0	95
6832	1	Cholla Road	1	1	11	1968	8524	2011					0	96
6726	1	UNNAMED WATERWAY	1	1	1	1966	20559	2011					0	96.1
5771	1	UNNAMED WATERWAY	1	1	1	1955	17163	2011					0	96.4
6339	1	UNNAMED WATERWAY	1	1	1	1961	17170	2011					0	96.4
8752	1	RIO GRANDE	1	1	17	1989	3386	2011					0	96.4
10089	1	UNNAMED WATERWAY	1	1	8	1993	823	2011					0	96.4
6969	8	UNNAMED WATERWAY	1	1	17	1968	5055	2011					0	96.5
6971	1	UNNAMED WATERWAY	1	1	1	1968	16533	2011					0	96.5
6972	1	UNNAMED WATERWAY	1	1	1	1968	15947	2011					0	96.5
5772	1	UNNAMED WATERWAY	1	1	1	1955	14456	2011					0	96.6
6337	1	UNNAMED WATERWAY	1	1	1	1961	15112	2011					0	96.6
6338	1	UNNAMED WATERWAY	1	1	1	1961	14456	2011					0	96.6
6974	8	UNNAMED WWAY I25 MP142.7	1	1	9	1968	509	2011					0	96.8
7260	1	Boutz Street	1	1	11	1971	11150	2011					0	97
7261	1	Boutz Street	1	1	11	1971	11195	2011					0	97
9206	1	Rinconada Road	1	1	14	2003	21197	2011					0	97
9207	1	Rinconada Road	1	1	14	2003	22894	2011					0	97
9208	1	Sonoma Ranch Road	1	1	14	2003	21197	2011					0	97
9209	1	Sonoma Ranch Road	1	1	14	2004	22894	2011					0	97
9212	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9213	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9214	1	Holman Road / Dunn Drive	1	1	14	2003	11258	2011					0	97
9215	1	Hollman Road / Dunn Driv	1	1	14	2007	11385	2011					0	97
9216	1	Weisner Road	1	1	2	2007	5226	2011					0	97
9217	1	Weisner Road	1	1	2	2003	4708	2011					0	97
9219	1	Brahman Road	1	1	2	2003	4708	2011					0	97
8765	1	RIO GRANDE	1	1	7	1992	1076	2011					0	97.4
6833	8	FILLMORE ARROYO	1	1	17	1968	5136	2012					0	97.5
9151	1	I-25 SBL ON RAMP	1	1	14	2002	17544	2011					0	97.5

6184	1	UNNAMED WATERWAY	1	1	1	1961	16676	2011					0	83
6826	1	Missouri Avenue	1	1	11	1968	18999	2011					2	83
7264	1	IG 1142 Ramp 'E'	1	1	11	1971	10007	2011					1	83
5583	1	IRRIGATION CANAL	1	1	2	1933	4858	2011					0	83.8
6829	1	Cholla Road	1	1	11	1968	3980	2011					0	84
6830	1	Cholla Road	1	1	11	1968	4440	2011					0	84
5294	1	LEASBURG CANAL	2	2	9	1954	509	2011	76	7	114	2008	0	84.1
8761	1	WEST SIDE CANAL	2	2	9	1989	823	2011	34	3	52	2030	0	84.9
8182	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8189	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8818	1	RIO GRANDE	1	1	14	1992	13375	2011					0	86.1
7710	1	LEASBURG CANAL	2	2	9	1940	509	2011					0	86.3
7712	1	LEASBURG CANAL	2	2	9	1941	509	2011					0	86.3
6834	1	Fillmore Arroyo	1	1	1	1968	16533	2011					0	87
6835	1	Fillmore Arroyo	1	1	1	1968	15947	2011					0	87
7706	1	EAST SIDE CANAL	2	2	9	1956	823	2011					0	87.9
7266	1	UNION AVENUE	1	1	11	1971	10007	2011					1	88
3249	1	IRRIGATION CANAL	1	1	7	1933	2194	2011	14	1	16	2008	0	88.2
7270	8	TORTUGAS ARROYO	1	1	17	1972	90	2011					0	89
7723	1	LEASBURG CANAL	2	2	9	1974	509	2011					0	90.8
9104	1	Wells-Geothermal Drive	1	1	11	2001	8420	2011					0	91
6662	1	I-10 EB/WB	1	1	14	1966	4186	2011	621	62	932	2030	0	91.6
9265	1	TRIVIZ DRIVE	1	1	14	2003	34906	2011					0	92.4
9210	1	MESA GRANDE DRIVE	1	1	14	2003	21197	2011					0	93
9103	1	Spruce Street	1	1	11	2001	40094	2011					0	93.2
6134	1	I-25 NBL/SBL	1	1	14	1960	17544	2011	515	51	772	2030	2	94
7267	1	UNION AVENUE	1	1	11	1971	8524	2011					1	94
9450	1	DRIPPING SPRINGS TORTUGA	2	2	16	2008	2729	2011					0	94
8181	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	94.1
7705	1	EAST SIDE CANAL	2	2	9	1956	509	2011					0	94.2
6831	1	Cholla Road	1	1	11	1968	10007	2011					0	95
7265	1	Ramp E of I-10	1	1	11	1971	8524	2011					1	95
9211	1	MESA GRANDE DRIVE	1	1	14	2003	22894	2011					0	95
9236	1	NASA Road	1	1	2	2003	5226	2011					0	95
9237	1	NASA Road	1	1	2	2003	4708	2011					0	95
6832	1	Cholla Road	1	1	11	1968	8524	2011					0	96
6726	1	UNNAMED WATERWAY	1	1	1	1966	20559	2011					0	96.1
5771	1	UNNAMED WATERWAY	1	1	1	1955	17163	2011					0	96.4
6339	1	UNNAMED WATERWAY	1	1	1	1961	17170	2011					0	96.4
8752	1	RIO GRANDE	1	1	17	1989	3386	2011					0	96.4
10089	1	UNNAMED WATERWAY	1	1	8	1993	823	2011					0	96.4
6969	8	UNNAMED WATERWAY	1	1	17	1968	5055	2011					0	96.5
6971	1	UNNAMED WATERWAY	1	1	1	1968	16533	2011					0	96.5
6972	1	UNNAMED WATERWAY	1	1	1	1968	15947	2011					0	96.5
5772	1	UNNAMED WATERWAY	1	1	1	1955	14456	2011					0	96.6
6337	1	UNNAMED WATERWAY	1	1	1	1961	15112	2011					0	96.6
6338	1	UNNAMED WATERWAY	1	1	1	1961	14456	2011					0	96.6
6974	8	UNNAMED WWAY I25 MP142.7	1	1	9	1968	509	2011					0	96.8
7260	1	Boutz Street	1	1	11	1971	11150	2011					0	97
7261	1	Boutz Street	1	1	11	1971	11195	2011					0	97
9206	1	Rinconada Road	1	1	14	2003	21197	2011					0	97
9207	1	Rinconada Road	1	1	14	2003	22894	2011					0	97
9208	1	Sonoma Ranch Road	1	1	14	2003	21197	2011					0	97
9209	1	Sonoma Ranch Road	1	1	14	2004	22894	2011					0	97
9212	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9213	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9214	1	Holman Road / Dunn Drive	1	1	14	2003	11258	2011					0	97
9215	1	Hollman Road / Dunn Driv	1	1	14	2007	11385	2011					0	97
9216	1	Weisner Road	1	1	2	2007	5226	2011					0	97
9217	1	Weisner Road	1	1	2	2003	4708	2011					0	97
9219	1	Brahman Road	1	1	2	2003	4708	2011					0	97
8765	1	RIO GRANDE	1	1	7	1992	1076	2011					0	97.4
6833	8	FILLMORE ARROYO	1	1	17	1968	5136	2012					0	97.5
9151	1	I-25 SBL ON RAMP	1	1	14	2002	17544	2011					0	97.5

6184	1	UNNAMED WATERWAY		1	1	1	1961	16676	2011					0	83
6826	1	Missouri Avenue		1	1	11	1968	18999	2011					2	83
7264	1	IG 1142 Ramp 'E'		1	1	11	1971	10007	2011					1	83
5583	1	IRRIGATION CANAL		1	1	2	1933	4858	2011					0	83.8
6829	1	Cholla Road		1	1	11	1968	3980	2011					0	84
6830	1	Cholla Road		1	1	11	1968	4440	2011					0	84
5294	1	LEASBURG CANAL		2	2	9	1954	509	2011	76	7	114	2008	0	84.1
8761	1	WEST SIDE CANAL		2	2	9	1989	823	2011	34	3	52	2030	0	84.9
8182	1	IRRIGATION CANAL		2	2	9	1979	509	2011					0	86.1
8189	1	IRRIGATION CANAL		2	2	9	1979	509	2011					0	86.1
8818	1	RIO GRANDE		1	1	14	1992	13375	2011					0	86.1
7710	1	LEASBURG CANAL		2	2	9	1940	509	2011					0	86.3
7712	1	LEASBURG CANAL		2	2	9	1941	509	2011					0	86.3
6834	1	Fillmore Arroyo		1	1	1	1968	16533	2011					0	87
6835	1	Fillmore Arroyo		1	1	1	1968	15947	2011					0	87
7706	1	EAST SIDE CANAL		2	2	9	1956	823	2011					0	87.9
7266	1	UNION AVENUE		1	1	11	1971	10007	2011					1	88
3249	1	IRRIGATION CANAL		1	1	7	1933	2194	2011	14	1	16	2008	0	88.2
7270	8	TORTUGAS ARROYO		1	1	17	1972	90	2011					0	89
7723	1	LEASBURG CANAL		2	2	9	1974	509	2011					0	90.8
9104	1	Wells-Geothermal Drive		1	1	11	2001	8420	2011					0	91
6662	1	I-10 EB/WB		1	1	14	1966	4186	2011	621	62	932	2030	0	91.6
9265	1	TRIVIZ DRIVE		1	1	14	2003	34906	2011					0	92.4
9210	1	MESA GRANDE DRIVE		1	1	14	2003	21197	2011					0	93
9103	1	Spruce Street		1	1	11	2001	40094	2011					0	93.2
6134	1	I-25 NBL/SBL		1	1	14	1960	17544	2011	515	51	772	2030	2	94
7267	1	UNION AVENUE		1	1	11	1971	8524	2011					1	94
9450	1	DRIPPING SPRINGS TORTUGA		2	2	16	2008	2729	2011					0	94
8181	1	IRRIGATION CANAL		2	2	9	1979	509	2011					0	94.1
7705	1	EAST SIDE CANAL		2	2	9	1956	509	2011					0	94.2
6831	1	Cholla Road		1	1	11	1968	10007	2011					0	95
7265	1	Ramp E of I-10		1	1	11	1971	8524	2011					1	95
9211	1	MESA GRANDE DRIVE		1	1	14	2003	22894	2011					0	95
9236	1	NASA Road		1	1	2	2003	5226	2011					0	95
9237	1	NASA Road		1	1	2	2003	4708	2011					0	95
6832	1	Cholla Road		1	1	11	1968	8524	2011					0	96
6726	1	UNNAMED WATERWAY		1	1	1	1966	20559	2011					0	96.1
5771	1	UNNAMED WATERWAY		1	1	1	1955	17163	2011					0	96.4
6339	1	UNNAMED WATERWAY		1	1	1	1961	17170	2011					0	96.4
8752	1	RIO GRANDE		1	1	17	1989	3386	2011					0	96.4
10089	1	UNNAMED WATERWAY		1	1	8	1993	823	2011					0	96.4
6969	8	UNNAMED WATERWAY		1	1	17	1968	5055	2011					0	96.5
6971	1	UNNAMED WATERWAY		1	1	1	1968	16533	2011					0	96.5
6972	1	UNNAMED WATERWAY		1	1	1	1968	15947	2011					0	96.5
5772	1	UNNAMED WATERWAY		1	1	1	1955	14456	2011					0	96.6
6337	1	UNNAMED WATERWAY		1	1	1	1961	15112	2011					0	96.6
6338	1	UNNAMED WATERWAY		1	1	1	1961	14456	2011					0	96.6
6974	8	UNNAMED WWAY I25 MP142.7		1	1	9	1968	509	2011					0	96.8
7260	1	Boutz Street		1	1	11	1971	11150	2011					0	97
7261	1	Boutz Street		1	1	11	1971	11195	2011					0	97
9206	1	Rinconada Road		1	1	14	2003	21197	2011					0	97
9207	1	Rinconada Road		1	1	14	2003	22894	2011					0	97
9208	1	Sonoma Ranch Road		1	1	14	2003	21197	2011					0	97
9209	1	Sonoma Ranch Road		1	1	14	2004	22894	2011					0	97
9212	1	PORTER DRIVE		1	1	14	2003	11385	2011					0	97
9213	1	PORTER DRIVE		1	1	14	2003	11385	2011					0	97
9214	1	Holman Road / Dunn Drive		1	1	14	2003	11258	2011					0	97
9215	1	Hollman Road / Dunn Driv		1	1	14	2007	11385	2011					0	97
9216	1	Weisner Road		1	1	2	2007	5226	2011					0	97
9217	1	Weisner Road		1	1	2	2003	4708	2011					0	97
9219	1	Brahman Road		1	1	2	2003	4708	2011					0	97
8765	1	RIO GRANDE		1	1	7	1992	1076	2011					0	97.4
6833	8	FILLMORE ARROYO		1	1	17	1968	5136	2012					0	97.5
9151	1	I-25 SBL ON RAMP		1	1	14	2002	17544	2011					0	97.5

6184	1	UNNAMED WATERWAY	1	1	1	1961	16676	2011					0	83
6826	1	Missouri Avenue	1	1	11	1968	18999	2011					2	83
7264	1	IG 1142 Ramp 'E'	1	1	11	1971	10007	2011					1	83
5583	1	IRRIGATION CANAL	1	1	2	1933	4858	2011					0	83.8
6829	1	Cholla Road	1	1	11	1968	3980	2011					0	84
6830	1	Cholla Road	1	1	11	1968	4440	2011					0	84
5294	1	LEASBURG CANAL	2	2	9	1954	509	2011	76	7	114	2008	0	84.1
8761	1	WEST SIDE CANAL	2	2	9	1989	823	2011	34	3	52	2030	0	84.9
8182	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8189	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8818	1	RIO GRANDE	1	1	14	1992	13375	2011					0	86.1
7710	1	LEASBURG CANAL	2	2	9	1940	509	2011					0	86.3
7712	1	LEASBURG CANAL	2	2	9	1941	509	2011					0	86.3
6834	1	Fillmore Arroyo	1	1	1	1968	16533	2011					0	87
6835	1	Fillmore Arroyo	1	1	1	1968	15947	2011					0	87
7706	1	EAST SIDE CANAL	2	2	9	1956	823	2011					0	87.9
7266	1	UNION AVENUE	1	1	11	1971	10007	2011					1	88
3249	1	IRRIGATION CANAL	1	1	7	1933	2194	2011	14	1	16	2008	0	88.2
7270	8	TORTUGAS ARROYO	1	1	17	1972	90	2011					0	89
7723	1	LEASBURG CANAL	2	2	9	1974	509	2011					0	90.8
9104	1	Wells-Geothermal Drive	1	1	11	2001	8420	2011					0	91
6662	1	I-10 EB/WB	1	1	14	1966	4186	2011	621	62	932	2030	0	91.6
9265	1	TRIVIZ DRIVE	1	1	14	2003	34906	2011					0	92.4
9210	1	MESA GRANDE DRIVE	1	1	14	2003	21197	2011					0	93
9103	1	Spruce Street	1	1	11	2001	40094	2011					0	93.2
6134	1	I-25 NBL/SBL	1	1	14	1960	17544	2011	515	51	772	2030	2	94
7267	1	UNION AVENUE	1	1	11	1971	8524	2011					1	94
9450	1	DRIPPING SPRINGS TORTUGA	2	2	16	2008	2729	2011					0	94
8181	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	94.1
7705	1	EAST SIDE CANAL	2	2	9	1956	509	2011					0	94.2
6831	1	Cholla Road	1	1	11	1968	10007	2011					0	95
7265	1	Ramp E of I-10	1	1	11	1971	8524	2011					1	95
9211	1	MESA GRANDE DRIVE	1	1	14	2003	22894	2011					0	95
9236	1	NASA Road	1	1	2	2003	5226	2011					0	95
9237	1	NASA Road	1	1	2	2003	4708	2011					0	95
6832	1	Cholla Road	1	1	11	1968	8524	2011					0	96
6726	1	UNNAMED WATERWAY	1	1	1	1966	20559	2011					0	96.1
5771	1	UNNAMED WATERWAY	1	1	1	1955	17163	2011					0	96.4
6339	1	UNNAMED WATERWAY	1	1	1	1961	17170	2011					0	96.4
8752	1	RIO GRANDE	1	1	17	1989	3386	2011					0	96.4
10089	1	UNNAMED WATERWAY	1	1	8	1993	823	2011					0	96.4
6969	8	UNNAMED WATERWAY	1	1	17	1968	5055	2011					0	96.5
6971	1	UNNAMED WATERWAY	1	1	1	1968	16533	2011					0	96.5
6972	1	UNNAMED WATERWAY	1	1	1	1968	15947	2011					0	96.5
5772	1	UNNAMED WATERWAY	1	1	1	1955	14456	2011					0	96.6
6337	1	UNNAMED WATERWAY	1	1	1	1961	15112	2011					0	96.6
6338	1	UNNAMED WATERWAY	1	1	1	1961	14456	2011					0	96.6
6974	8	UNNAMED WWAY I25 MP142.7	1	1	9	1968	509	2011					0	96.8
7260	1	Boutz Street	1	1	11	1971	11150	2011					0	97
7261	1	Boutz Street	1	1	11	1971	11195	2011					0	97
9206	1	Rinconada Road	1	1	14	2003	21197	2011					0	97
9207	1	Rinconada Road	1	1	14	2003	22894	2011					0	97
9208	1	Sonoma Ranch Road	1	1	14	2003	21197	2011					0	97
9209	1	Sonoma Ranch Road	1	1	14	2004	22894	2011					0	97
9212	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9213	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9214	1	Holman Road / Dunn Drive	1	1	14	2003	11258	2011					0	97
9215	1	Hollman Road / Dunn Driv	1	1	14	2007	11385	2011					0	97
9216	1	Weisner Road	1	1	2	2007	5226	2011					0	97
9217	1	Weisner Road	1	1	2	2003	4708	2011					0	97
9219	1	Brahman Road	1	1	2	2003	4708	2011					0	97
8765	1	RIO GRANDE	1	1	7	1992	1076	2011					0	97.4
6833	8	FILLMORE ARROYO	1	1	17	1968	5136	2012					0	97.5
9151	1	I-25 SBL ON RAMP	1	1	14	2002	17544	2011					0	97.5

Agency	Asset Type	Format	includes	gaps
City of Las Cruces				
	DA County Roads	GIS	road centerline	
	Trails	GIS		surface type included in
	Transit Stops	GIS	facilities at stops	
	Transit Routes	GIS	length, route #	
Doña Ana County				
	DA County Roads	GIS	surface, field for ROW width	ROW width many times not populated
	Trails	GIS	name, type, surface	need data dictionary
NMDOT				
	Roads	GIS		
	Crash Data	GIS	point file of crash locations with attributes	link to GIS roadway segment
Town of Mesilla				
	Map of Roads	paper		
NMSU				
	DA County Roads	GIS	road centerline	

NBI SELECTED FIELDS AND VALUES FOR BRIDGES WITHIN THE MESILLA VALLEY MPO

ITEM8	ITEM5C	ITEM6A	ITEM21 (Maintenance Responsibility)	ITEM22 (Owner)	ITEM26 (Functional Class of Inventory	ITEM27 (Yr Built)	ITEM29 (ADT)	ITEM30 (Yr of ADT)	ITEM94 (Bridge Improvement Cost in $1,000s)	ITEM95 (Roadway Improvement Cost)	ITEM96 (Total Project Cost)	ITEM97 (Yr of Improvement Cost)	NM12_txt_STATUS	NM12_txt_SUFFICIENCY_RATING
578	1	DRAINAGE DITCH	2	2	9	1951	509	2011	67	6	100	2030	1	29.7
2730	1	IRRIGATION CANAL	1	1	17	1934	3386	2011	44	4	66	2008	1	35.7
2814	1	IRRIGATION CANAL	1	1	8	1972	948	2011	22	2	34	2008	1	38.4
2388	1	IRRIGATION CANAL	1	1	7	1923	5574	2011	33	3	50	2008	1	41.3
7714	1	LEASBURG CANAL	2	2	9	1940	509	2011	25	2	38	2030	2	44.6
7700	1	THREE SAINTS MAIN CANAL	2	2	9	1972	509	2011	27	2	41	2030	2	45.5
7703	1	IRRIGATION CANAL	2	2	9	1940	823	2011	21	2	32	2030	1	49
7707	1	IRRIGATION CANAL	2	2	9	1938	823	2011	104	10	156	2030	0	59.6
5295	1	WESTSIDE CANAL	1	1	17	1954	2392	2011	94	9	141	2008	2	61.4
7173	1	NM-292	1	1	11	1971	14698	2011	506	50	760	2030	1	62.4
2368	1	DEL RIO DRAIN	1	1	8	1945	251	2011	38	3	57	2008	2	65.5
5723	1	ALAMEDA ARROYO	1	1	14	1957	10978	2011	316	31	474	2008	2	66.4
5724	1	ALAMEDA ARROYO	1	1	14	1957	9572	2011	316	31	474	2008	2	66.6
2969	1	UNNAMED WATERWAY	1	1	14	1933	44091	2011					0	66.9
6827	1	Interstate Ramps	1	1	11	1968	14971	2011	569	56	854	2030	1	68
6828	1	Interstate Ramps	1	1	11	1968	13720	2011	569	56	854	2030	1	68
6272	1	Leasburg Canal	1	1	7	1962	1320	2011					0	68.3
6336	1	UNNAMED WATERWAY	1	1	1	1961	15112	2011	77	8	90	2008	1	68.9
4551	1	RIO GRANDE	2	1	7	1941	2294	2011	558	55	837	2008	2	69.2
6183	1	SANDHILL ARROYO	1	1	11	1961	16676	2011					0	69.8
7174	1	NM-292	1	1	11	1971	16206	2011	398	39	597	2030	1	70
7258	1	NM-28(Ave. De. Mesilla	1	1	11	1971	11150	2011	462	46	694	2030	1	70
7259	1	NM-28(Ave. De Mesilla)	1	1	11	1971	11195	2011	200	100	350	2030	1	70
4283	1	RIO GRANDE	2	2	8	1941	948	2011	544	54	816	2008	2	70.1
4263	1	RIO GRANDE	2	2	9	1941	818	2011	483	48	725	2008	2	70.7
7709	1	LAS CRUCES LATERAL	2	2	9	1944	797	2011	16	1	25	2030	2	70.8
7713	1	LEASBURG CANAL	2	2	9	1941	823	2011	36	3	55	2030	0	74.7
5584	1	LEASBURG CANAL	1	1	2	1933	20108	2011	47	4	70	2008	0	74.8
3243	1	LEASBURG CANAL	2	2	9	1930	509	2011	252	25	294	2008	0	77.5
6343	1	LAS CRUCES ARROYO	4	4	14	1962	26170	2011					0	77.5
6668	1	I-25 NB and SB	1	1	7	1966	1382	2011	5000	5000	11000	2020	1	77.8
6734	1	LOCAL ROAD	1	1	1	1966	8693	2011	193	19	289	2030	2	78
6194	1	UNNAMED WATERWAY	1	1	11	1960	40094	2011					0	78.4
2593	1	UNNAMED WATERWAY	1	1	7	1932	607	2011					0	78.7
2966	1	UNNAMED WATERWAY	1	1	7	1932	607	2011	195	19	293	2008	0	78.7
9174	1	ROADRUNNER PARKWAY	1	1	14	2003	44091	2011					0	78.8
6187	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	79
6239	1	I-10 EBL/WBL	1	1	8	1961	150	2011	200	25	300	2030	1	79
6732	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	79
9218	1	Brahman Road	1	1	2	2003	5226	2011					0	79
5769	1	UNNAMED WATERWAY	1	1	1	1955	34333	2011					0	79.1
7701	1	IRRIGATION CANAL	2	2	9	1974	509	2011	33	3	50	2030	0	79.7
6189	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	80
9355	1	UNNAMED WATERWAY	1	1	2	2003	9934	2011					0	80
9173	1	DEL REY BOULAVARD	1	1	14	2002	17544	2011					0	80.8
6045	1	UNNAMED WATERWAY	1	1	1	1958	34333	2011	409	40	614	2030	2	81
7636	1	SOUTHERN CANAL	4	4	17	1975	3373	2011	68	7	101	2020	0	81.6
5661	1	UNNAMED WATERWAY	1	1	2	1954	10551	2011					0	81.8
6190	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6191	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6192	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6733	1	UNNAMED WATERWAY	1	1	1	1960	8693	2011					0	82
6735	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	82
6736	1	UNNAMED WATERWAY	1	1	1	1966	8693	2011					0	82
6825	1	Missouri Avenue	1	1	11	1968	18668	2011					2	82
6973	1	UNNAMED WATERWAY	1	1	11	1968	8420	2011					0	82
6975	1	UNNAMED WATERWAY	1	1	11	1968	8420	2011					0	82
9266	1	NM-101, NM-478, BNSF R/R	1	1	1	2004	607	2011					0	82
6737	1	UNNAMED WATERWAY	1	1	1	1966	7890	2011					0	82.1

6184	1	UNNAMED WATERWAY	1	1	1	1961	16676	2011					0	83
6826	1	Missouri Avenue	1	1	11	1968	18999	2011					2	83
7264	1	IG 1142 Ramp 'E'	1	1	11	1971	10007	2011					1	83
5583	1	IRRIGATION CANAL	1	1	2	1933	4858	2011					0	83.8
6829	1	Cholla Road	1	1	11	1968	3980	2011					0	84
6830	1	Cholla Road	1	1	11	1968	4440	2011					0	84
5294	1	LEASBURG CANAL	2	2	9	1954	509	2011	76	7	114	2008	0	84.1
8761	1	WEST SIDE CANAL	2	2	9	1989	823	2011	34	3	52	2030	0	84.9
8182	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8189	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	86.1
8818	1	RIO GRANDE	1	1	14	1992	13375	2011					0	86.1
7710	1	LEASBURG CANAL	2	2	9	1940	509	2011					0	86.3
7712	1	LEASBURG CANAL	2	2	9	1941	509	2011					0	86.3
6834	1	Fillmore Arroyo	1	1	1	1968	16533	2011					0	87
6835	1	Fillmore Arroyo	1	1	1	1968	15947	2011					0	87
7706	1	EAST SIDE CANAL	2	2	9	1956	823	2011					0	87.9
7266	1	UNION AVENUE	1	1	11	1971	10007	2011					1	88
3249	1	IRRIGATION CANAL	1	1	7	1933	2194	2011	14	1	16	2008	0	88.2
7270	8	TORTUGAS ARROYO	1	1	17	1972	90	2011					0	89
7723	1	LEASBURG CANAL	2	2	9	1974	509	2011					0	90.8
9104	1	Wells-Geothermal Drive	1	1	11	2001	8420	2011					0	91
6662	1	I-10 EB/WB	1	1	14	1966	4186	2011	621	62	932	2030	0	91.6
9265	1	TRIVIZ DRIVE	1	1	14	2003	34906	2011					0	92.4
9210	1	MESA GRANDE DRIVE	1	1	14	2003	21197	2011					0	93
9103	1	Spruce Street	1	1	11	2001	40094	2011					0	93.2
6134	1	I-25 NBL/SBL	1	1	14	1960	17544	2011	515	51	772	2030	2	94
7267	1	UNION AVENUE	1	1	11	1971	8524	2011					1	94
9450	1	DRIPPING SPRINGS TORTUGA	2	2	16	2008	2729	2011					0	94
8181	1	IRRIGATION CANAL	2	2	9	1979	509	2011					0	94.1
7705	1	EAST SIDE CANAL	2	2	9	1956	509	2011					0	94.2
6831	1	Cholla Road	1	1	11	1968	10007	2011					0	95
7265	1	Ramp E of I-10	1	1	11	1971	8524	2011					1	95
9211	1	MESA GRANDE DRIVE	1	1	14	2003	22894	2011					0	95
9236	1	NASA Road	1	1	2	2003	5226	2011					0	95
9237	1	NASA Road	1	1	2	2003	4708	2011					0	95
6832	1	Cholla Road	1	1	11	1968	8524	2011					0	96
6726	1	UNNAMED WATERWAY	1	1	1	1966	20559	2011					0	96.1
5771	1	UNNAMED WATERWAY	1	1	1	1955	17163	2011					0	96.4
6339	1	UNNAMED WATERWAY	1	1	1	1961	17170	2011					0	96.4
8752	1	RIO GRANDE	1	1	17	1989	3386	2011					0	96.4
10089	1	UNNAMED WATERWAY	1	1	8	1993	823	2011					0	96.4
6969	8	UNNAMED WATERWAY	1	1	17	1968	5055	2011					0	96.5
6971	1	UNNAMED WATERWAY	1	1	1	1968	16533	2011					0	96.5
6972	1	UNNAMED WATERWAY	1	1	1	1968	15947	2011					0	96.5
5772	1	UNNAMED WATERWAY	1	1	1	1955	14456	2011					0	96.6
6337	1	UNNAMED WATERWAY	1	1	1	1961	15112	2011					0	96.6
6338	1	UNNAMED WATERWAY	1	1	1	1961	14456	2011					0	96.6
6974	8	UNNAMED WWAY I25 MP142.7	1	1	9	1968	509	2011					0	96.8
7260	1	Boutz Street	1	1	11	1971	11150	2011					0	97
7261	1	Boutz Street	1	1	11	1971	11195	2011					0	97
9206	1	Rinconada Road	1	1	14	2003	21197	2011					0	97
9207	1	Rinconada Road	1	1	14	2003	22894	2011					0	97
9208	1	Sonoma Ranch Road	1	1	14	2003	21197	2011					0	97
9209	1	Sonoma Ranch Road	1	1	14	2004	22894	2011					0	97
9212	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9213	1	PORTER DRIVE	1	1	14	2003	11385	2011					0	97
9214	1	Holman Road / Dunn Drive	1	1	14	2003	11258	2011					0	97
9215	1	Hollman Road / Dunn Driv	1	1	14	2007	11385	2011					0	97
9216	1	Weisner Road	1	1	2	2007	5226	2011					0	97
9217	1	Weisner Road	1	1	2	2003	4708	2011					0	97
9219	1	Brahman Road	1	1	2	2003	4708	2011					0	97
8765	1	RIO GRANDE	1	1	7	1992	1076	2011					0	97.4
6833	8	FILLMORE ARROYO	1	1	17	1968	5136	2012					0	97.5
9151	1	I-25 SBL ON RAMP	1	1	14	2002	17544	2011					0	97.5

6823	1	I-25 NB and SB	1	1	14	1968	25763	2011					0	98
7169	1	Local Road (NM 359)	1	1	11	1971	10370	2011					0	98
7170	1	Local Road	1	1	11	1971	10189	2011					0	98
7171	1	Rio Grande & Local Road	1	1	11	1971	10370	2011					0	98
7172	1	Rio Grande	1	1	11	1971	10189	2011					0	98
7268	1	Tortugas Arroyo	1	1	11	1972	10007	2011					0	98
7269	1	Tortugas Arroyo	1	1	11	1972	8524	2011					0	98
9264	1	I-25 NB and SB	1	1	14	2002	38773	2011					0	98
9267	1	NM-101, NM-478, BNSF R/R	1	1	1	2004	13685	2011					0	98
9335	1	NM-320	1	1	1	2007	8073	2011					0	98
9336	1	NM-320	1	1	1	2007	8603	2011					0	98
9153	7	US-70 WB FRONTAGE ROAD	1	1	11	2002	3196	2011					0	98.2
9154	7	EB FRONTAGE ROAD	1	1	11	2002	3196	2011					0	98.2
6273	1	EASTSIDE CANAL	1	1	7	1962	2990	2011					0	98.6
6970	7	UNNAMED WATERWAY	1	1	11	1968	2075	2011					0	99.2
10088	1	UNNAMED WATERWAY	11	1	8	1993	823	2011					0	99.4
10090	1	UNNAMED WATERWAY	1	1	8	1993	823	2011					0	99.4
9284	1	RIO GRANDE	1	1	7	2003	607	2011					0	99.8
8780	1	I-10 EB and WB	1	1	7	1990	3583	2011					0	100
9152	7	I-25 NB and SB	1	1	2	2001	3196	2011					0	100
10092	7	UNNAMED WATERWAY	1	1	1	1995	2212	2011					0	100

NBI SELECTED

2388	1	IRRIGATION CANAL	1	1	7	1923
3243	1	LEASBURG CANAL	2	2	9	1930
2966	1	UNNAMED WATERWAY	1	1	7	1932
2593	1	UNNAMED WATERWAY	1	1	7	1932
3249	1	IRRIGATION CANAL	1	1	7	1933
5583	1	IRRIGATION CANAL	1	1	2	1933
5584	1	LEASBURG CANAL	1	1	2	1933
2969	1	UNNAMED WATERWAY	1	1	14	1933
2730	1	IRRIGATION CANAL	1	1	17	1934
7707	1	IRRIGATION CANAL	2	2	9	1938
7710	1	LEASBURG CANAL	2	2	9	1940
7703	1	IRRIGATION CANAL	2	2	9	1940
7714	1	LEASBURG CANAL	2	2	9	1940
7712	1	LEASBURG CANAL	2	2	9	1941
7713	1	LEASBURG CANAL	2	2	9	1941
4263	1	RIO GRANDE	2	2	9	1941
4283	1	RIO GRANDE	2	2	8	1941
4551	1	RIO GRANDE	2	1	7	1941
7709	1	LAS CRUCES LATERAL	2	2	9	1944
2368	1	DEL RIO DRAIN	1	1	8	1945
578	1	DRAINAGE DITCH	2	2	9	1951
5294	1	LEASBURG CANAL	2	2	9	1954
5661	1	UNNAMED WATERWAY	1	1	2	1954
5295	1	WESTSIDE CANAL	1	1	17	1954
5772	1	UNNAMED WATERWAY	1	1	1	1955
5771	1	UNNAMED WATERWAY	1	1	1	1955
5769	1	UNNAMED WATERWAY	1	1	1	1955
7705	1	EAST SIDE CANAL	2	2	9	1956
7706	1	EAST SIDE CANAL	2	2	9	1956
5724	1	ALAMEDA ARROYO	1	1	14	1957
5723	1	ALAMEDA ARROYO	1	1	14	1957
6045	1	UNNAMED WATERWAY	1	1	1	1958
6134	1	I-25 NBL/SBL	1	1	14	1960
6190	1	UNNAMED WATERWAY	1	1	1	1960
6191	1	UNNAMED WATERWAY	1	1	1	1960
6192	1	UNNAMED WATERWAY	1	1	1	1960
6733	1	UNNAMED WATERWAY	1	1	1	1960
6189	1	UNNAMED WATERWAY	1	1	1	1960
6187	1	UNNAMED WATERWAY	1	1	1	1960
6194	1	UNNAMED WATERWAY	1	1	11	1960
6337	1	UNNAMED WATERWAY	1	1	1	1961
6338	1	UNNAMED WATERWAY	1	1	1	1961
6339	1	UNNAMED WATERWAY	1	1	1	1961
6184	1	UNNAMED WATERWAY	1	1	1	1961
6239	1	I-10 EBL/WBL	1	1	8	1961
6183	1	SANDHILL ARROYO	1	1	11	1961
6336	1	UNNAMED WATERWAY	1	1	1	1961
6273	1	EASTSIDE CANAL	1	1	7	1962
6343	1	LAS CRUCES ARROYO	4	4	14	1962
6272	1	Leasburg Canal	1	1	7	1962
6726	1	UNNAMED WATERWAY	1	1	1	1966
6662	1	I-10 EB/WB	1	1	14	1966
6737	1	UNNAMED WATERWAY	1	1	1	1966

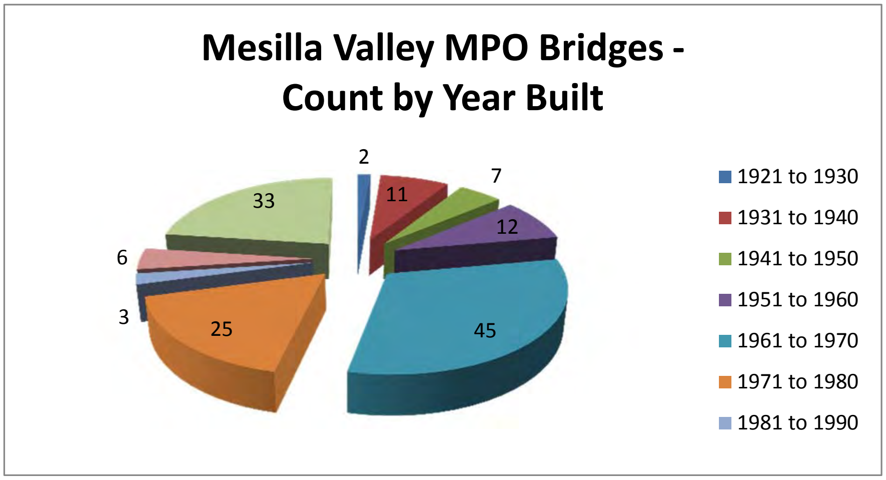
6735	1	UNNAMED WATERWAY	1	1	1	1966
6736	1	UNNAMED WATERWAY	1	1	1	1966
6732	1	UNNAMED WATERWAY	1	1	1	1966
6734	1	LOCAL ROAD	1	1	1	1966
6668	1	I-25 NB and SB	1	1	7	1966
6970	7	UNNAMED WATERWAY	1	1	11	1968
6823	1	I-25 NB and SB	1	1	14	1968
6833	8	FILLMORE ARROYO	1	1	17	1968
6974	8	UNNAMED WWAY I25 MP142.7	1	1	9	1968
6969	8	UNNAMED WATERWAY	1	1	17	1968
6971	1	UNNAMED WATERWAY	1	1	1	1968
6972	1	UNNAMED WATERWAY	1	1	1	1968
6832	1	Cholla Road	1	1	11	1968
6831	1	Cholla Road	1	1	11	1968
6834	1	Fillmore Arroyo	1	1	1	1968
6835	1	Fillmore Arroyo	1	1	1	1968
6829	1	Cholla Road	1	1	11	1968
6830	1	Cholla Road	1	1	11	1968
6826	1	Missouri Avenue	1	1	11	1968
6825	1	Missouri Avenue	1	1	11	1968
6973	1	UNNAMED WATERWAY	1	1	11	1968
6975	1	UNNAMED WATERWAY	1	1	11	1968
6827	1	Interstate Ramps	1	1	11	1968
6828	1	Interstate Ramps	1	1	11	1968
7169	1	Local Road (NM 359)	1	1	11	1971
7170	1	Local Road	1	1	11	1971
7171	1	Rio Grande & Local Road	1	1	11	1971
7172	1	Rio Grande	1	1	11	1971
7260	1	Boutz Street	1	1	11	1971
7261	1	Boutz Street	1	1	11	1971
7265	1	Ramp E of I-10	1	1	11	1971
7267	1	UNION AVENUE	1	1	11	1971
7266	1	UNION AVENUE	1	1	11	1971
7264	1	IG 1142 Ramp 'E'	1	1	11	1971
7174	1	NM-292	1	1	11	1971
7258	1	NM-28(Ave. De. Mesilla	1	1	11	1971
7259	1	NM-28(Ave. De Mesilla)	1	1	11	1971
7173	1	NM-292	1	1	11	1971
7268	1	Tortugas Arroyo	1	1	11	1972
7269	1	Tortugas Arroyo	1	1	11	1972
7270	8	TORTUGAS ARROYO	1	1	17	1972
7700	1	THREE SAINTS MAIN CANAL	2	2	9	1972
2814	1	IRRIGATION CANAL	1	1	8	1972
7723	1	LEASBURG CANAL	2	2	9	1974
7701	1	IRRIGATION CANAL	2	2	9	1974
7636	1	SOUTHERN CANAL	4	4	17	1975
8181	1	IRRIGATION CANAL	2	2	9	1979
8182	1	IRRIGATION CANAL	2	2	9	1979
8189	1	IRRIGATION CANAL	2	2	9	1979
8752	1	RIO GRANDE	1	1	17	1989
8761	1	WEST SIDE CANAL	2	2	9	1989
8780	1	I-10 EB and WB	1	1	7	1990
8765	1	RIO GRANDE	1	1	7	1992
8818	1	RIO GRANDE	1	1	14	1992
10088	1	UNNAMED WATERWAY	11	1	8	1993

10090	1	UNNAMED WATERWAY	1	1	8	1993
10089	1	UNNAMED WATERWAY	1	1	8	1993
10092	7	UNNAMED WATERWAY	1	1	1	1995
9152	7	I-25 NB and SB	1	1	2	2001
9103	1	Spruce Street	1	1	11	2001
9104	1	Wells-Geothermal Drive	1	1	11	2001
9153	7	US-70 WB FRONTAGE ROAD	1	1	11	2002
9154	7	EB FRONTAGE ROAD	1	1	11	2002
9264	1	I-25 NB and SB	1	1	14	2002
9151	1	I-25 SBL ON RAMP	1	1	14	2002
9173	1	DEL REY BOULAVARD	1	1	14	2002
9284	1	RIO GRANDE	1	1	7	2003
9206	1	Rinconada Road	1	1	14	2003
9207	1	Rinconada Road	1	1	14	2003
9208	1	Sonoma Ranch Road	1	1	14	2003
9212	1	PORTER DRIVE	1	1	14	2003
9213	1	PORTER DRIVE	1	1	14	2003
9214	1	Holman Road / Dunn Drive	1	1	14	2003
9217	1	Weisner Road	1	1	2	2003
9219	1	Brahman Road	1	1	2	2003
9211	1	MESA GRANDE DRIVE	1	1	14	2003
9236	1	NASA Road	1	1	2	2003
9237	1	NASA Road	1	1	2	2003
9210	1	MESA GRANDE DRIVE	1	1	14	2003
9265	1	TRIVIZ DRIVE	1	1	14	2003
9355	1	UNNAMED WATERWAY	1	1	2	2003
9218	1	Brahman Road	1	1	2	2003
9174	1	ROADRUNNER PARKWAY	1	1	14	2003
9267	1	NM-101, NM-478, BNSF R/R	1	1	1	2004
9209	1	Sonoma Ranch Road	1	1	14	2004
9266	1	NM-101, NM-478, BNSF R/R	1	1	1	2004
9335	1	NM-320	1	1	1	2007
9336	1	NM-320	1	1	1	2007
9215	1	Hollman Road / Dunn Driv	1	1	14	2007
9216	1	Weisner Road	1	1	2	2007
9450	1	DRIPPING SPRINGS TORTUGA	2	2	16	2008

Maintenance Responsibility	Count
State Highway Agency	118
County Highway Agency	23
City of Municipal Highway Agency	2
Sate Park, Forest, or Reservation Agency	1
	144

Count	%
77	53%
44	31%
15	10%
5	3%
3	2%
144	

Year Built	# Bridges	%	
1921 to 1930	2	1%	
1931 to 1940	11	8%	
1941 to 1950	7	5%	
1951 to 1960	12	8%	
1961 to 1970	45	31%	
1971 to 1980	25	17%	
1981 to 1990	3	2%	
1991 to 2000	6	4%	
2001 to 2010	33	23%	1938
	144		



APPENDIX B –

CITY OF LAS CRUCES PAVEMENT MANAGEMENT ANALYSIS REPORT

FEBRUARY 2012

BY IMS INFRASTRUCTURE MANAGEMENT SERVICES

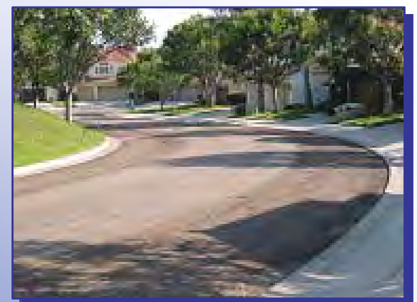
City of Las Cruces, NM

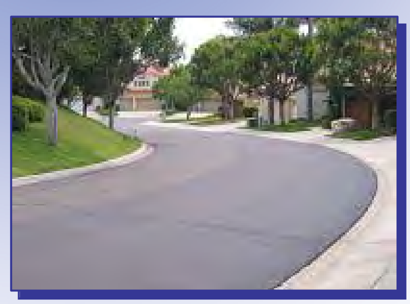
Pavement Management Analysis Report

February 2012

City of Las Cruces
Street Systems Department
1501 E. Hadley, Bldg I
Las Cruces, NM 88001

Attention: Gary Skelton, Engineering Technician





IMS Infrastructure Management Services
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List of Acronyms and Abbreviations

Abbreviation or Acronym	Definition
$M	Dollars in millions
ACP	Asphalt Concrete Pavement - asphalt streets
ART	Arterial roadway functional classification
ASTM	American Society of Testing Methods
Brk	Break
CAL	Coarse Aggregate Loss
CDV	Corrected Deduct Value
COL	Collector roadway functional classification
Crk	Crack
DeflCON	Deflection Condition - structural load analysis
Dvdd Slab	Divided Slab
DynaCON	Dynamic Condition - structural layer analysis
ft or FT	Foot
ft2 or FT2	Square foot
FunCL	Functional Classification
FWD	Falling weight deflectometer
GCI	Gravel Condition Index
GFP	Good - Fair - Poor
GIS	Geographic Information System
GISID	GIS segment identification number
H&V	Horizontal and Vertical
IRI	International Roughness Index
Jt	Joint
L&T	Longitudinal and Transverse
LAD	Load associated distress
LOC	Local roadway functional classification - same as RES
LOG	Lip of Gutter
m	metre
m2	sqaure metre
M	Moderate
MaxDV	Maximum Deduct Value
mi or Mi	Mile
MnART	Minor arterial roadway functional classification
MOD	Moderate
NLAD	Non-load associated distress
OCI	Overall condition index, also known as PCI
Olay	Overlay
PCC	Portland Cement Concrete - concrete streets
PCI	Pavement Condition Index - generic term for OCI
R&R	Remove and replace
Recon	Reconstruction
Rehab	Rehabilitation
RES	Local roadway functional classification - same as LOC
RI or RCI	Roughness Index
S	Strong
SDI	Surface Distress Index
SI	Structural Index
STA	Station or chainage
Surf Trtmt	Surface Treatment
TDV	Total Deduct Value
W	Weak

1.0 PROJECT DESCRIPTION

1.1 PRINCIPLES OF PAVEMENT MANAGEMENT

Nationwide, billions of dollars have been invested in roadway networks by municipal, state and federal governments. Locally, the City of Las Cruces has over 125 miles of major roadways (arterials and collectors) and 332 miles of residential roadways, encompassing over 85M square feet of asphalt and concrete surfacing. At a replacement cost approaching $1.1M per mile – not including the value of the land, the City has over $484 million invested in their paved roadway network.

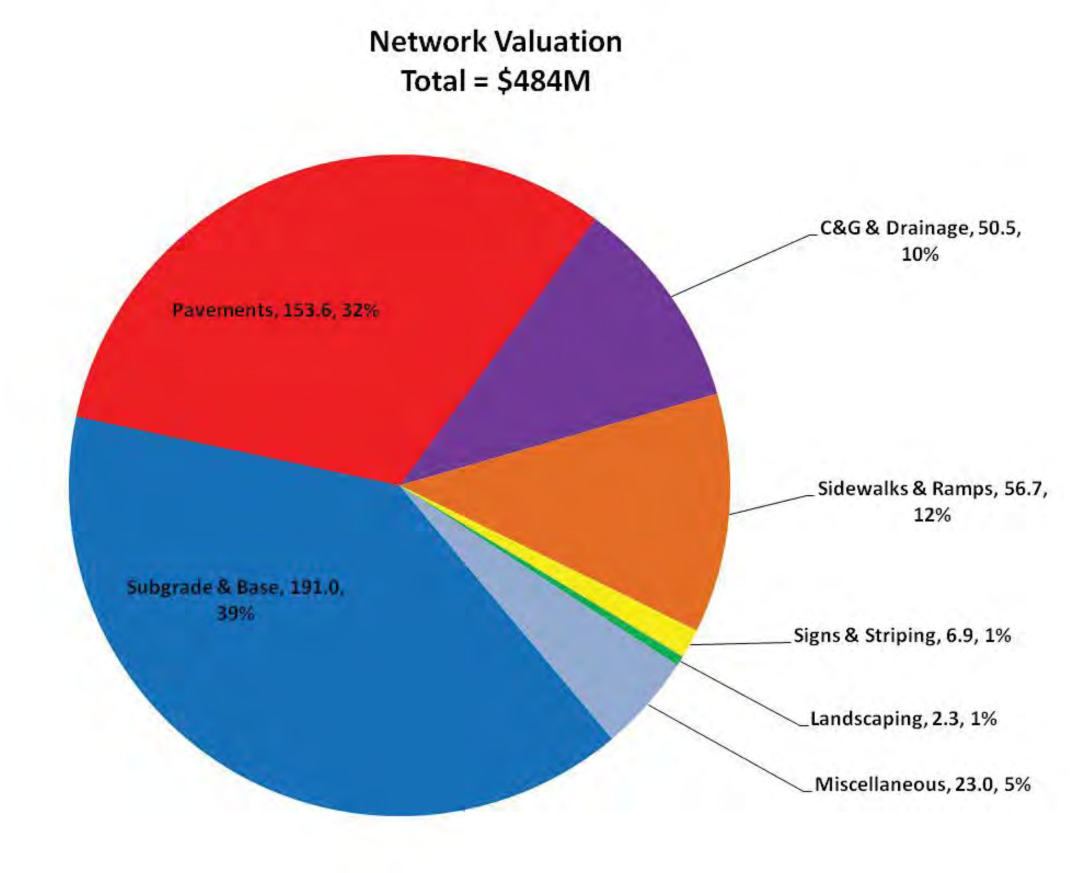


Figure 1 – Replacement Value of the City of Las Cruces Paved Roadway Network

Preservation of existing road and street systems has become a major activity for all levels of government. There is a shortage of funds to maintain street systems at all government levels. Funds that have been designated for pavement preservation must therefore be used as effectively as possible. One proven method to obtain maximum value of available funds is through the use of a pavement management system.

Pavement management is the process of planning, budgeting, funding, designing, constructing, monitoring, evaluating, maintaining, and rehabilitating the pavement network to provide maximum benefits from the available funds. A pavement management system is a set of tools or methods that assists decision makers in finding optimum strategies for providing and maintaining pavement in a serviceable condition over a given time period.

As shown in Figure 2, streets that are repaired when they are in a good condition will cost less over their lifetime than streets that are allowed to deteriorate to a poor condition. Without an adequate routine pavement maintenance program, streets require more frequent reconstruction, thereby costing millions of extra dollars. Over time, pavement quality drops until the pavement condition becomes unacceptable. For each street, the rate of deterioration, and hence shape of the curve, is dependent on many factors – foremost of which are the strength of the roadway structure and traffic loading. The key to a successful pavement management program is to develop a reasonably accurate performance model of the roadway, and then identify the optimal timing and rehabilitation strategy. The resultant benefit of this exercise is realized by the long term cost savings and increase in pavement quality over time. As illustrated in Figure 2, pavement typically deteriorates rapidly once it hits a specific threshold. A $1 investment after 40% lifespan is much more effective than deferring maintenance until heavier overlays or reconstruction is required just a few years later.

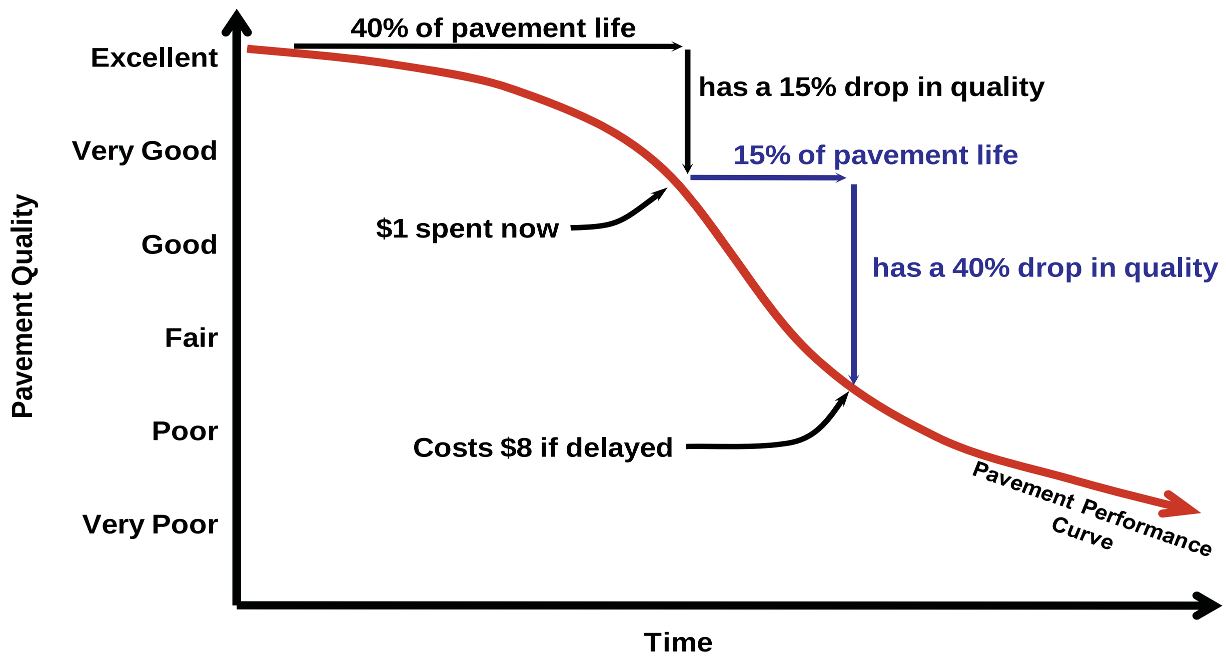


Figure 2 – Pavement Deterioration and Life Cycle Costs

Once implemented, an effective pavement information management system can assist agencies in developing long-term rehabilitation programs and budgets. The key is to develop policies and practices that delay the inevitable total reconstruction for as long as practical yet still remain within the target zone for cost effective rehabilitation.

That is, as each roadway approaches the steep part of its deterioration curve, apply a remedy that extends the pavement life - at a minimum cost, thereby avoiding costly heavy overlays and reconstruction. Thus, the goal of a pavement management system is to identify the optimal level of funding, timing, and renewal strategy agencies should adopt to keep their roadway network at a satisfactory level of service. Figure 3 illustrates the concept of extending pavement life through the application of timely rehabilitation activities.

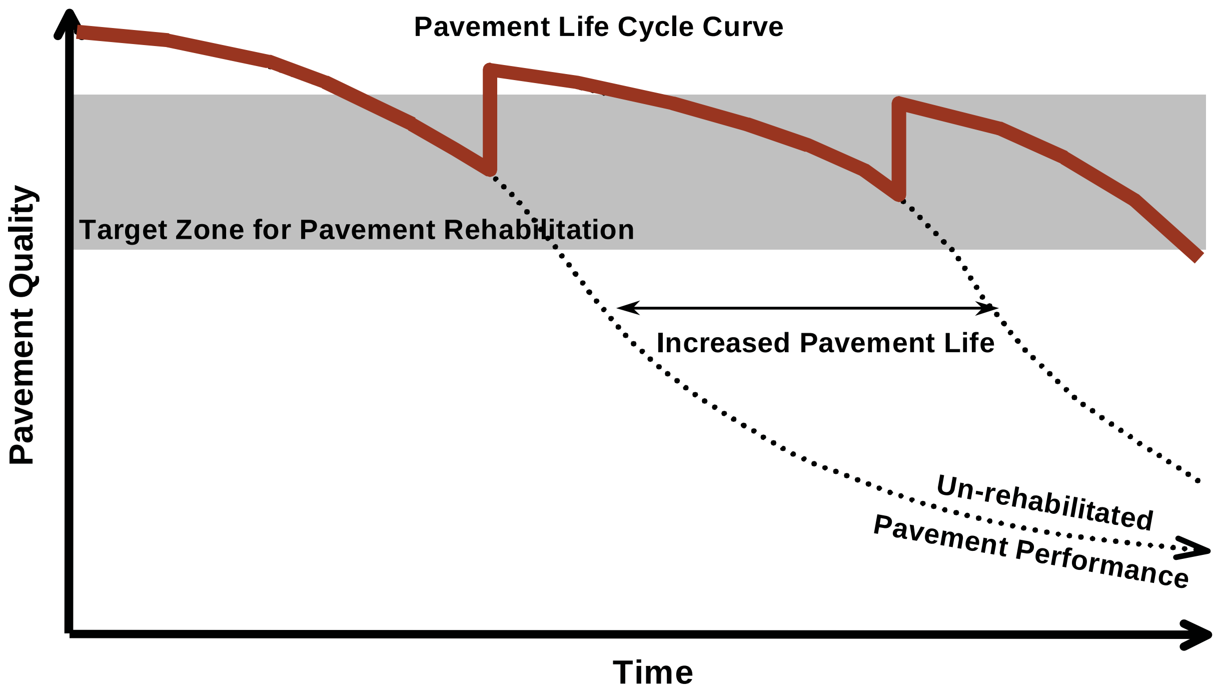


Figure 3 – Pavement Life Cycle Curve

Ideally, the lower limit of the target zone shown in Figure 3 would be a condition rating of 70 – that is to keep maintenance requirements on as many streets as possible to a thin overlay or less. The upper limit should be close to the upper range of the very good category – that is a pavement condition score of 85.

Other functions of a pavement management system include assessing effectiveness of maintenance activities and new technologies, and storing historical data and images.

1.2 THE PAVEMENT MANAGEMENT PROCESS

The actual pavement management process involves three unique, but important steps, and is presented graphically in Figure 4. Each activity builds on the previous, until the end result is a prioritized paving and rehabilitation program.

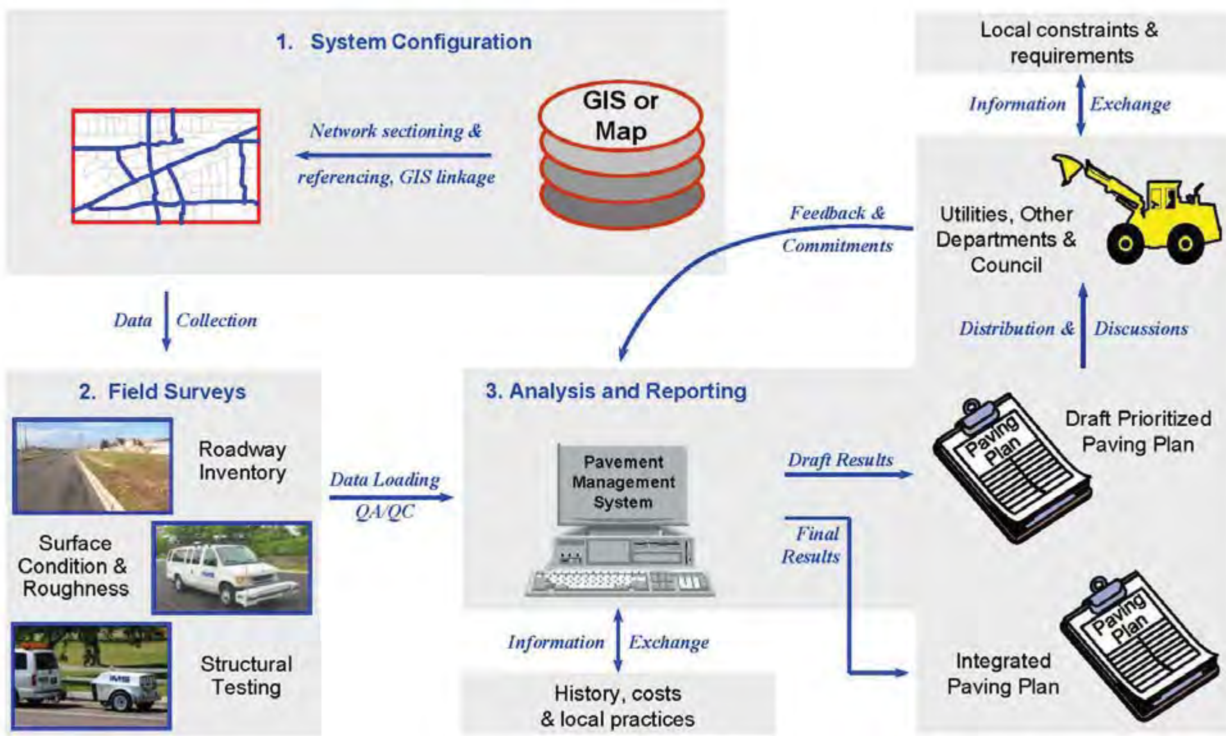


Figure 4 - The Pavement Management Process

Highlights of the pavement management process include:

1. **System Configuration** – this step involves identifying all roadways in the City's network, assigning them a unique identifier, listing their physical characteristics (length, width etc,) and demographic attributes (pavement type, traffic, functional classification), and linking the network to the City's GIS map.

2. **Field Surveys** – following a set of pre-defined assessment protocols matching the City's Lucity Pavement Management software (ASTM D6433-09), a specialized piece of survey equipment - referred to as a Laser Road Surface Tester (Laser RST, pictured below), was used to collect observations on the condition of the pavement surface, as well as collect digital imagery and spatial coordinate information. The Laser RST surveyed each street from end to end in a single pass, with arterial roadways completed in two passes.

   Data collected by the Laser RST includes:

   - Rutting – measurement of wheel path rut depths by severity and length on asphalt roads. Rut depths are a concern for two reasons – if there is insufficient cross slope, they can hold water and thus cause loss of vehicle control. They also identify areas of loss of structural base or asphalt strength. On asphalt streets, rutting is incorporated into the surface distress observations.

- Roughness Index – Roughness is measured following the industry standard "International Roughness Index" (IRI). It is an open-ended score that measures the number of bumps per mile and reports the value as millimeters/meter. The IRI value is converted to a 0 to 100 score and reported as the Roughness Index (RI) as follows:

  RI = (11 – 3.5 x ln(IRI)) x 10, where ln(IRI) is the natural logarithm of IRI.

- Surface Distress Index – The Laser RST collects surface distress observations based on the extent and severity of distress encountered along the length of the roadway following ASTM D6433-09 protocols for asphalt and concrete pavements. The surface distress condition (cracking, potholes, raveling and the like) is considered by the traveling public to be the most important aspect in assessing the overall pavement condition.

  Not all distresses are weighted equally within the Surface Distresses Index. Certain load associated distresses (distresses caused by traffic loading) , such as rutting or alligator cracking on asphalt streets, or divided slab on concrete streets, have a much higher impact on the surface distress index than non-load associated ones such as raveling or patching. Even at low extents and moderate severity – less than 10% of the total area, load associated distresses can drop the Surface Distress Index considerably.

  ASTM D 6433-09 also has algorithms within it to correct for multiple or overlapping distresses within a segment.

Structural Index – Structural testing was completed on all arterial and collector roadways using a Dynflect Device. Dynaflects impact a known load to the pavement surface and the response (deflection) is recorded by a series of geophones located at fixed distances from the applied load. Specialized software and algorithms are then used to compare the deflections against anticipated traffic loading as well as complete a layer analysis.

2. **Analysis and Reporting** – following the field surveys, the condition data is assembled to create a single score representing the overall condition of the pavement. The Pavement Condition Index (PCI) is calculated by one of two formulas:

PCI = 33% Roughness + 67% Surface Distress if no deflection data was collected, or
PCI =25% Structure + 25% Roughness + 50% Surface Distress if deflection data was collected.

Within the City's Lucity software, all streets received a Structural Index score in order for the analysis to be completed efficiently. For segments with no deflection testing, a default Structural Index was entered based on the distresses encountered. The default Structural Index was assigned a weight value of zero - meaning it was not used in the PCI calculation, but rather acts as a placeholder for the analysis.

Analysis was completed using Las Cruces specific rehabilitation strategies, unit rates, priorities and pavement performance curves.

Laser Road Surface Tester (Laser RST)

1.3 UNDERSTANDING THE PAVEMENT CONDITION SCORE

The following illustration compares Pavement Condition Index (PCI) to commonly used descriptive terms. The divisions between the terms are not fixed, but are meant to reflect common perceptions of condition.

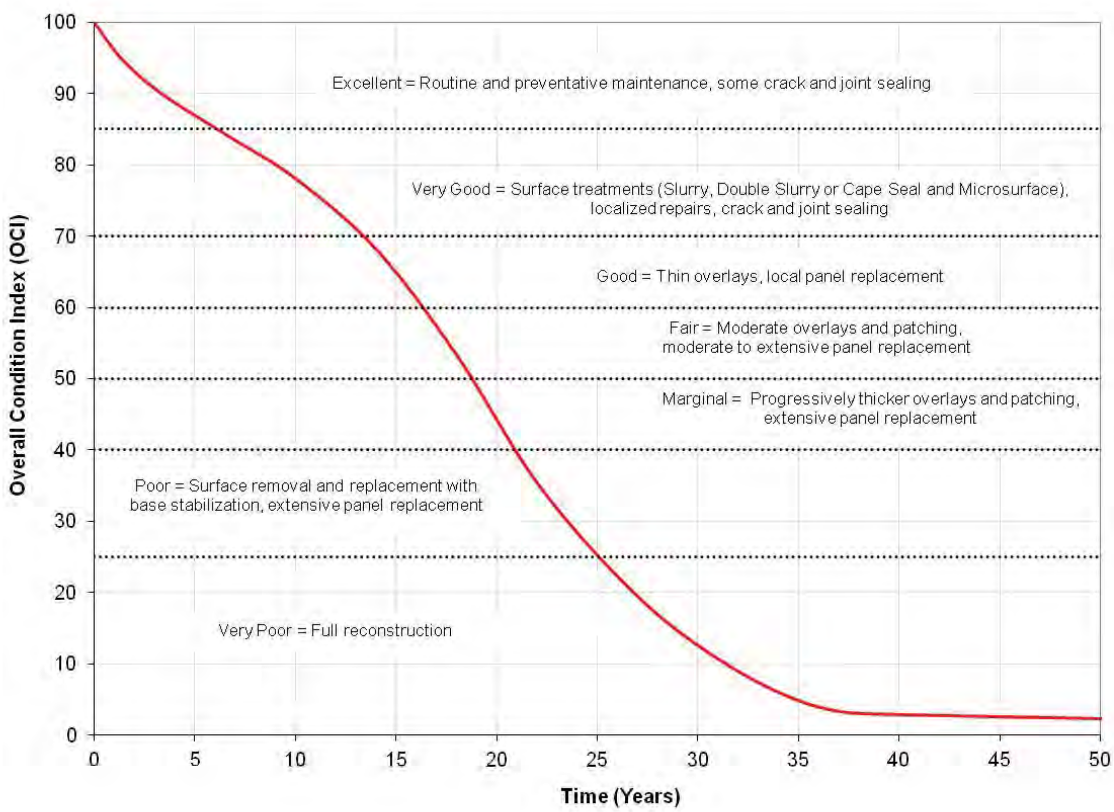


Figure 5 – Understanding the Pavement Condition Index Score

The general idea of what these condition levels mean with respect to remaining life and typical rehabilitation actions is included in the following table:

PCI Range	Description	Relative Remaining Life	Definition
85 – 100	Excellent	15 to 25 Years	Like new condition – little to no maintenance required when new; or routine maintenance such as crack and joint sealing.
70 – 85	Very Good	12 to 20 Years	Routine maintenance such as patching, crack sealing with surface treatments such as slurries or microsurfacing.
60 – 70	Good	10 to 15 Years	Heavier surface treatments and thin overlays. Localized panel replacements.
40 – 60	Fair to Marginal	7 to 12 Years	Progressively thicker overlays with localized repairs. Moderate to extensive panel replacements.
25 – 40	Poor	5 to 10 Years	Sections will require very thick overlays or surface replacement, base reconstruction and possible subgrade stabilization.
0 – 25	Very Poor	0 to 5 Years	High percentage of full reconstruction.

2.0 ROADWAY NETWORK CONDITION AND FINDINGS

2.1 ROADWAY NETWORK SIZE

The paved roadway network consists of five functional classes, covering approximately 457.2 miles of pavement. The average overall pavement condition of the roadway network (asphalt and concrete) at the time of the survey was 63, and is currently 62.5. The network has two pavement types: asphalt and concrete, with asphalt being majorly predominant. The following table summarizes the functional class splits within the system.

Network Summary

		Asphalt Network				Concrete Network			Network
	Asphalt	ART	COL	LOC	Concrete	ART	COL	LOC	
Segment Count	4996	693	469	3831	10	0	0	0	5006
Length (Ft)	2,404,691	433,028	219,361	1,752,303	9,385	8,257	0	1,128	2,414,077
Length (mi)	455.4	82.0	41.5	331.9	1.8	1.6	0.0	0.2	457.2
Area (Ft2)	85,177,781	20,899,558	7,952,985	56,325,238	603,118	563,171	0	39,947	85,780,899

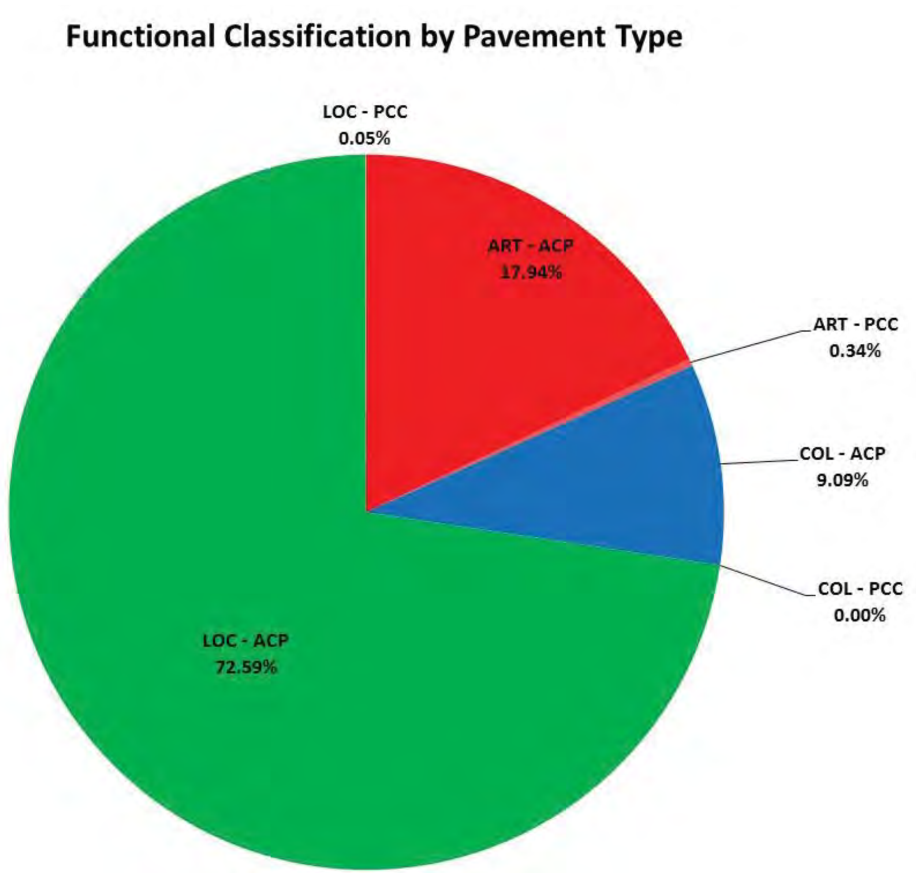


Figure 6 – Network Split by Functional Classification (%)

2.2 NETWORK PRESENT CONDITION

Figure 7 shows the distribution of pavement condition for the roadway network in the City of Las Cruces on a 0 to 100 scale, 0 being worst and 100 being best condition. At the time of the survey, the network PCI was 63, and is currently 62.5. While direct comparisons to other agencies are difficult, overall, Las Cruces is about the average of agencies recently surveyed by IMS.

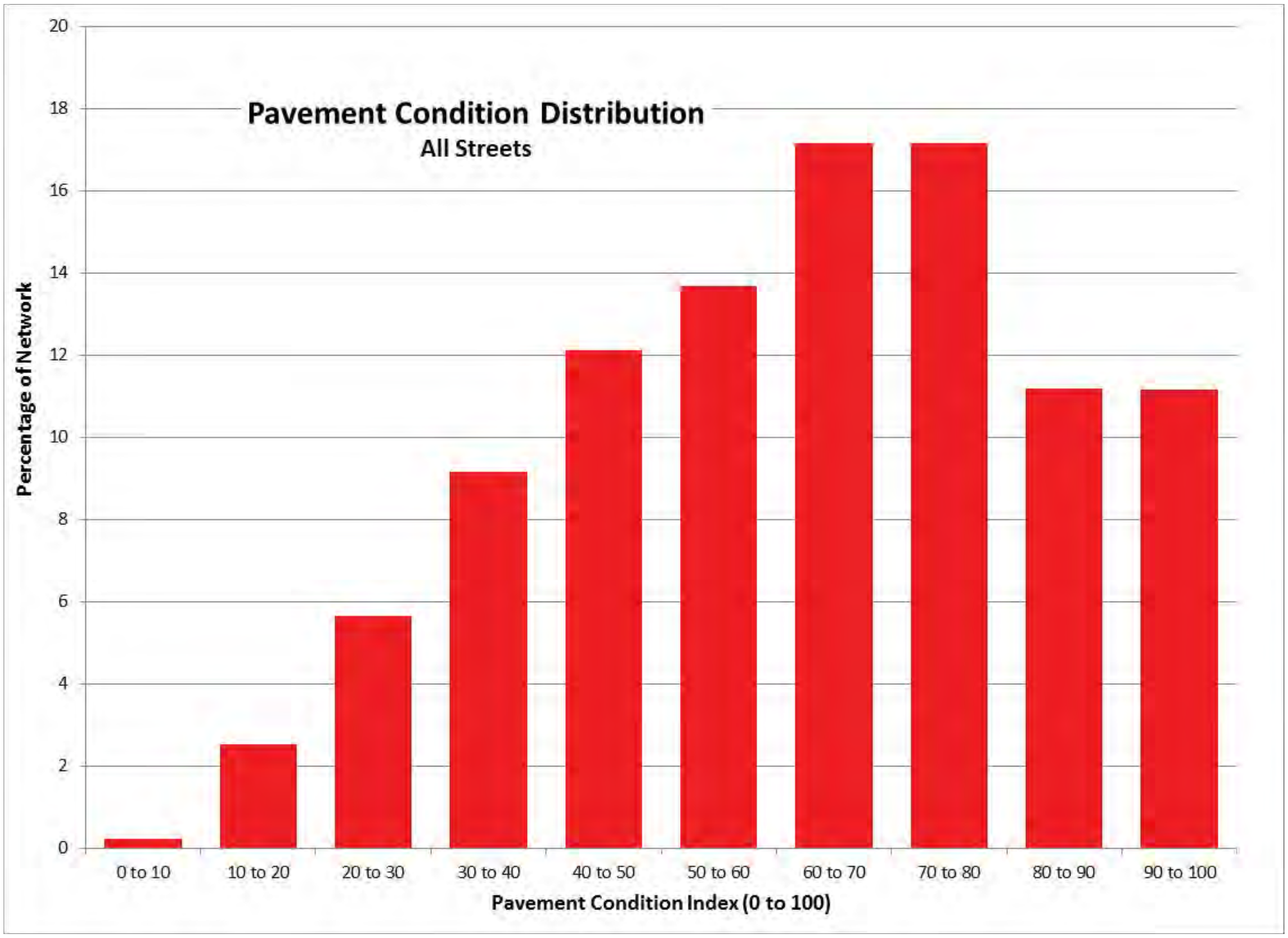


Figure 7 –Roadway Network Present Status

This is reflective of a moderately aged network that has had recent growth along with roadway renewal – as indicated by the high percentage of streets above 80. Simultaneously, the City has a large core of streets that are approaching the end of their life where surface based rehabilitations, such as overlays, can be effective.

The following graph (Figure 8) plots the same pavement condition information, but instead of using the actual Pavement Condition Index value, descriptive terms are used to classify the roadways. From the chart, 16% of the network can be considered in excellent condition with a PCI score greater than 85. These streets are in like new condition and require routine maintenance. Nationwide, the amount of roadways falling into the very good category is about 15%, so this value is right at the national average.

Just over 23% of the network falls into the very good classification. These are roads that benefit the most from preventative maintenance techniques such as microsurfacing, slurry seals and localized repairs. If left untreated these roadways will drop in quality to become heavy surface treatment or overlay candidates.

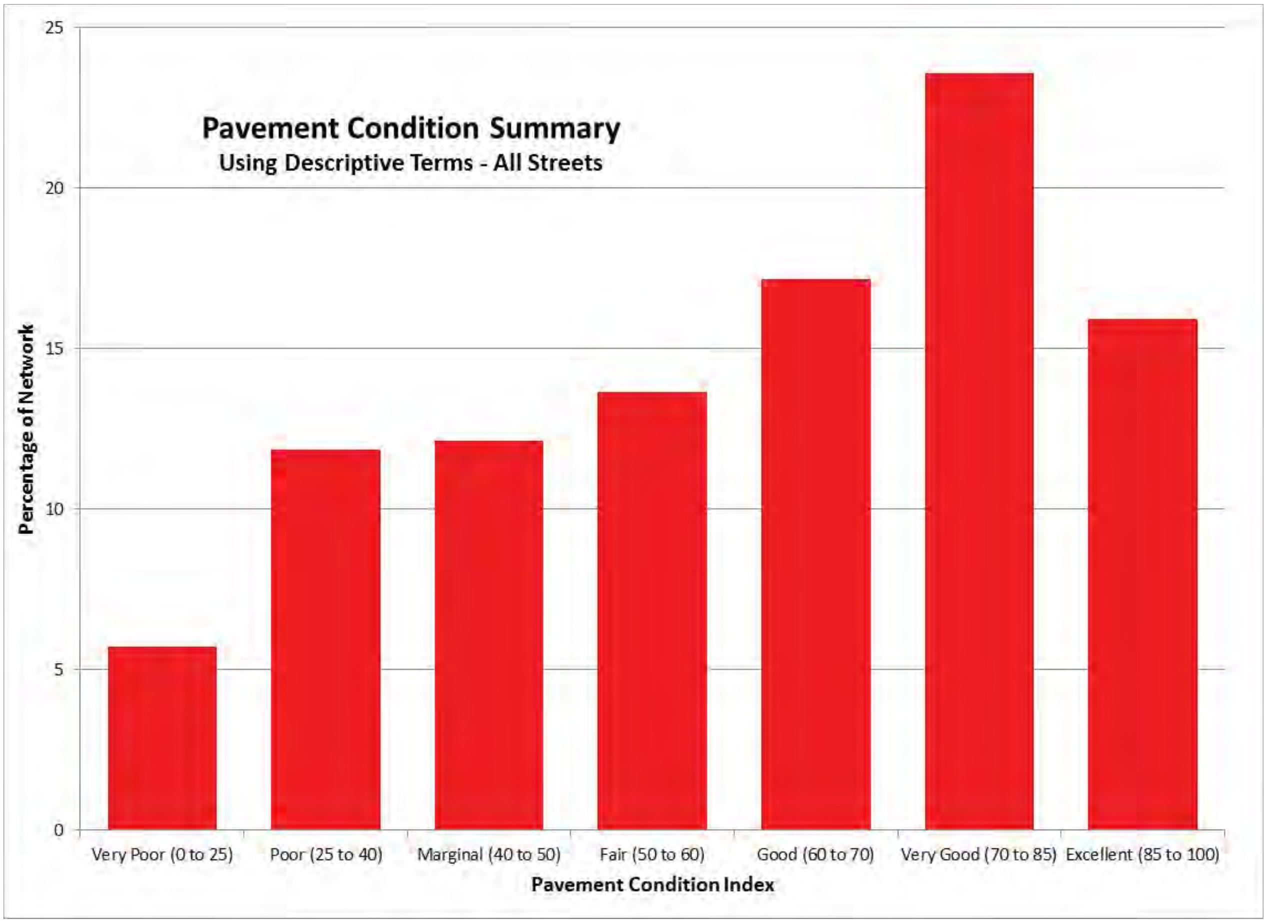


Figure 8 – Roadway Network Present Status Using Descriptive Terms

Seventeen percent (17%) of the streets are rated as good and are candidates for heavy surface treatment rehabilitation and thin overlays. Twenty six percent (26%) of the network can be considered in fair or marginal condition, representing candidates for progressively thicker overlay rehabilitation or panel replacements. If left untreated, they will decline rapidly into reconstruction candidates. The remaining 18% percent of the network is rated as "poor" or "very poor", meaning these roadways have failed or are past their optimal due point for overlay or surface based rehabilitation and may require progressively heavier or thicker forms of rehabilitation (such as surface reconstruction or deep patch and paving) or total reconstruction.

2.3 STRUCTURAL ANALYSIS (ARTERIALS AND COLLECTORS)

The collector and arterial roadway network was tested for structural adequacy using a Dynaflect device to complete a layer analysis of the pavement structure. Dynaflects apply a known load to the pavement and measures the pavement response to the load. The structural adequacy of a road is expressed as a 0 to 100 score with several key ranges: roadways with a Structural Index greater than 75 are deemed to be structurally adequate for the loading and may be treated with lightweight surface treatments or thin overlays; those between 45 and 75 typically reflect roads that require additional pavement thickness; and scores below 45 typically require reconstruction and increased base and pavement thickness. The following plot (Figure 9) presents the structural adequacy of the arterial and collector roadway network against its average pavement condition.

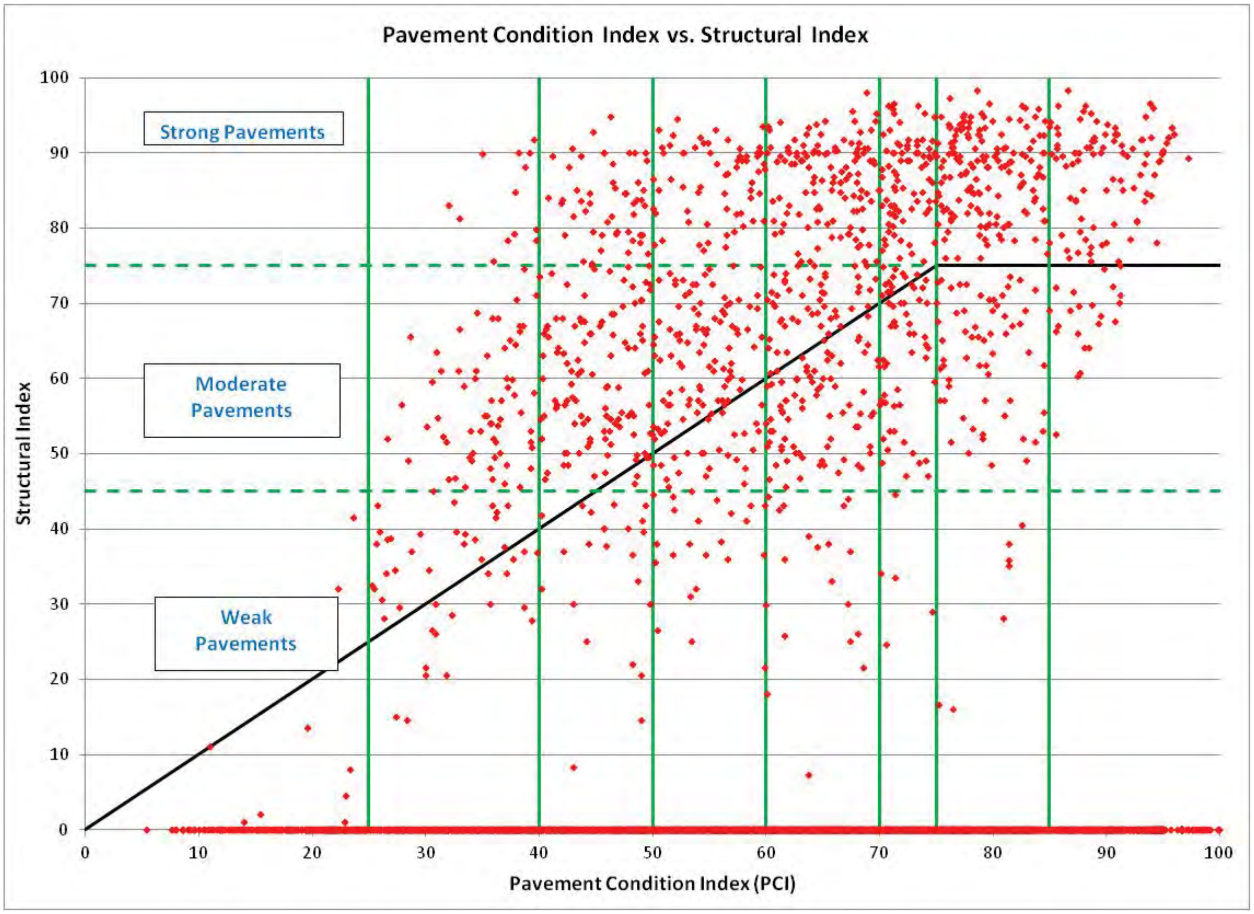


Figure 9 – Structural Adequacy of the Roadway Network

The diagonal black line separates roadways that are performing at or above expectations and lie above the line, from those that are not and fall below the line. Examination of the plot indicates the majority of the roadway segments are structurally adequate (that is above a Structural Index of 75), or fall above the diagonal performance line. The number of roadways falling below the diagonal line indicates the City has a moderate percentage of roadways that are inadequate for their structural loading. This is typically the result of insufficient base and structural materials during the original construction, or the application of overlays that were too thin during the lifetime of the roadway. Of particular concern are the small amount of roadway segments that have a pavement condition index (PCI) score greater 75, but fall below the diagonal performance line. These are segments that are rated as very good or excellent from a condition perspective, yet display poor structural quality.

The high number of roadway segments falling along the X-axis are the streets that were not structural tested.

2.4 LOAD ASSOCIATED DISTRESS ANALYSIS (RESIDENTIAL ROADS)

Closer examination of the surface defects as they relate to the overall pavement condition support the findings of the pavement condition survey. Generally, load associated distresses affect the overall condition score more than non-load associated distresses – and this is the case in Las Cruces. Load associated distresses are those that are directly related to traffic loading and structural capacity (alligator cracking, distortion and rutting). Non-load associated distresses are those that result from materials or environmental issues including shrinkage (transverse) cracking, bleeding and raveling. Figure 10 plots the relationship of the load associated distresses against pavement condition. As can be seen from the plot, at higher PCI scores, it is the non-load associated distresses that have a higher concentration of deducts over the load associated distresses. As the PCI score drops, the load associated distresses typically affect the PCI score to a higher degree. This is indicative of a network that has good pavement performance for the first half of a street's life, then suffers from progressive structural or base failures over time. High PCI score (above 70) rehab selection should focus on pavement preservation activities such as microsurfacing and thin overlays, possibly with some localized pavement repairs and crack sealing.

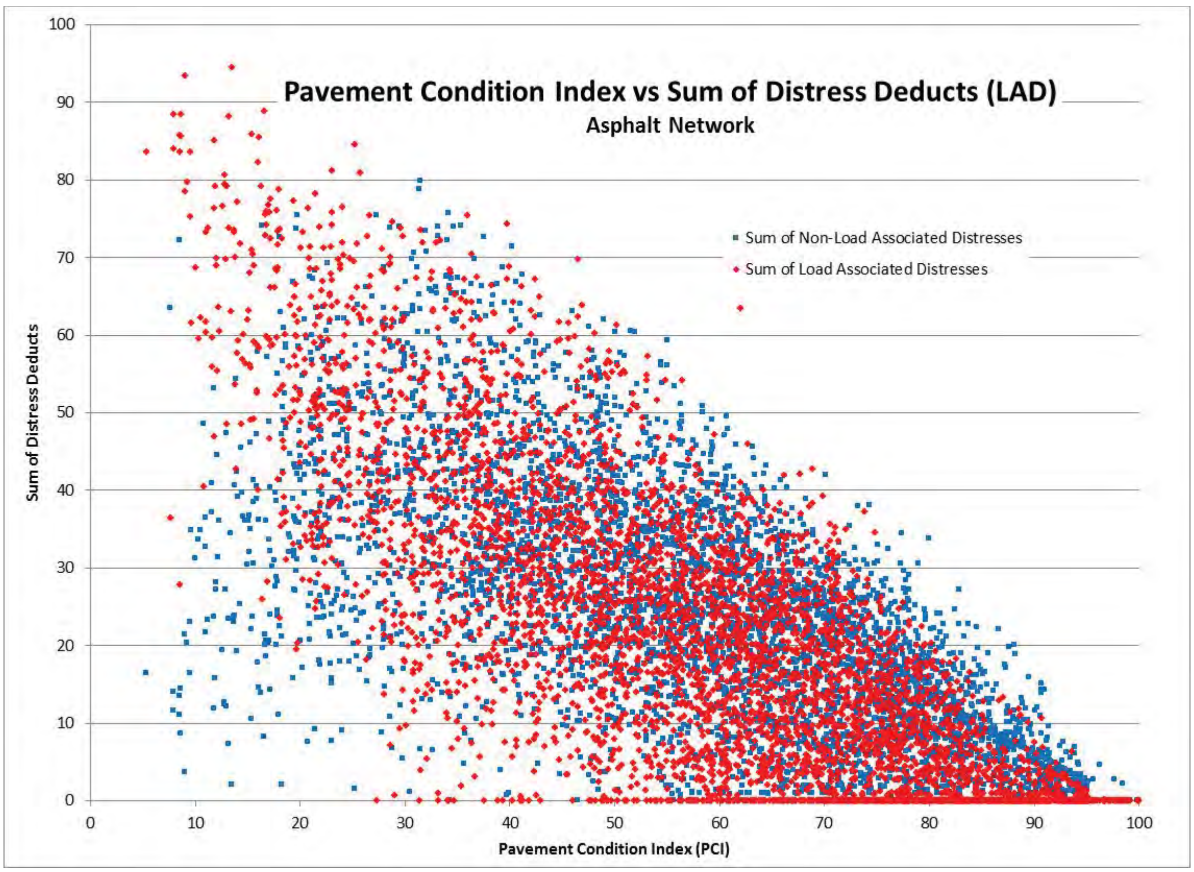


Figure 10 – Structural Adequacy of the Roadway Network

The sum of the Load-Associated Distress deducts (LAD for short) is also used to qualify the appropriate rehabilitation strategy in conjunction with the overall pavement condition score. For example, a street that has a good PCI score (between 60 and 70) and is displaying relatively low load associated distress deducts would be a suitable candidate for a surface treatment in place of a thin overlay because the PCI score is more influenced by materials issues such as transverse cracking or raveling.

2.5 INDEX DISTRIBUTION BY PAVEMENT TYPE

Figure 11 highlights the pavement condition distribution for the asphalt and concrete pavement. From the plot it is apparent the asphalt roadways (shown in red) have a much wider range of condition scores with a lower PCI average of 63, while the concrete roads tend to fall in the very good rating with an average PCI score of 79.

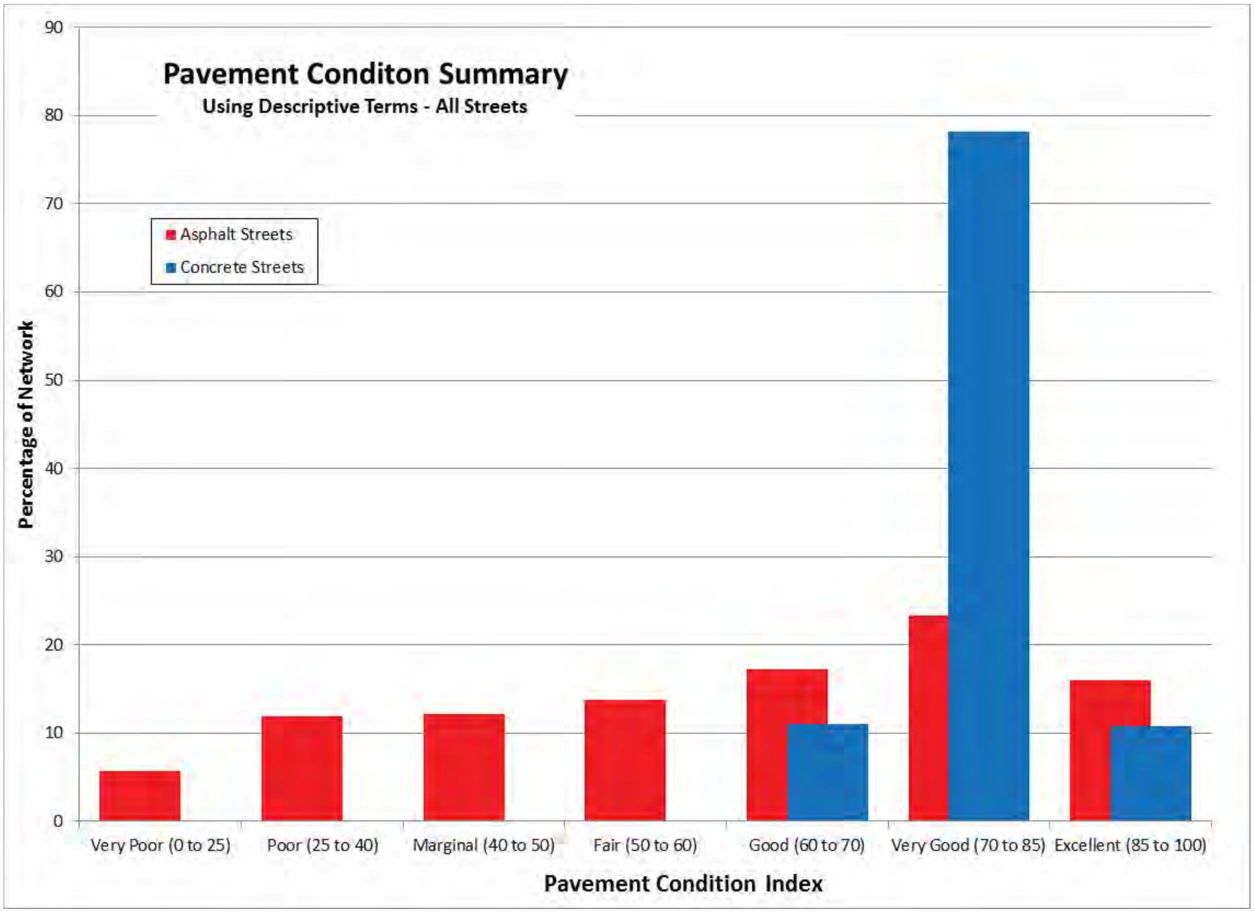


Figure 11 – PCI Distribution by Pavement Type Class

The following table presents the overall conditions scores by pavement type and functional class at the time of the survey.

	Asphalt Network				Concrete Network				All Streets			
	Network	ART	COL	LOC	Network	ART	COL	LOC	Network	ART	COL	LOC
Average PCI	63	66	61	62	79	75	0	66	63	66	61	62
Average SDI	58	57	55	59	85	80	0	0	58	58	55	59
Average RCI	70	76	70	67	67	63	0	52	70	76	70	67

2.6 RECONSTRUCTION BACKLOG

Backlog roadways are those that have dropped sufficiently in quality that surface rehabilitation efforts would no longer prove to be cost efficient and either partial or total reconstruction is required. Backlog is expressed as the percentage of roads requiring reconstruction as compared to the network totals.

Generally a backlog of 10% to 15% of the overall network is considered manageable from a funding point of view – a target value of less than 12% would be considered ideal. Backlogs approaching 20% and above tend to become unmanageable unless aggressively reduced through larger rehabilitation programs. For cities with a high backlog (that is approaching 20%, as is the case in Las Cruces) it is important that this value not be allowed to increase. It is also crucial that this number be lessened as to keep road maintenance manageable in the City. It is far more costly to let the backlog amount increase anymore and then attempt to reduce it later.

The concept of Pavement Condition Index (PCI) score and backlog must be fully understood in order to develop an effective pavement management program. The PCI score indicates the overall pavement condition and represents the amount of equity in the system and is the value most commonly considered when gauging the overall quality of a roadway network. It may also be used to define a desired level of service – that is an agency may wish to develop a pavement management program such that in 5 years the overall network score meets a set minimum value. It is the backlog however, that defines the amount of work an agency is facing and is willing to accept in the future. Further, it is the combination of the two that presents the true picture of the condition of a roadway network, and conversely defines improvement goals.

With the City of Las Cruces' PCI at 63 at the time of the surveys and the reconstruction backlog at 17.5%, the City's short term objectives needs to focus on not letting this backlog percentage increase by focusing its current rehab program on the asphalt network to arrest any potential PCI slide. Secondarily, the City must also focus on reducing the current backlog. The asphalt network forms virtually 100% of the city's overall backlog. Examination of Figure 11 indicates close to 17.5% of the city's asphalt roadways are in a backlog state requiring reconstruction and reducing it should be part of the City's focus when developing a rehabilitation program.

3.0 REHABILITATION PLAN AND BUDGET DEVELOPMENT

3.1 KEY ANALYSIS SET POINTS

Pavement management systems require user inputs in order to perform condition forecasting and prioritization. Key operating parameters, based on national empirical data and Las Cruces specific conditions, used in the analysis are as follows:

- **Pavement Performance Curves**

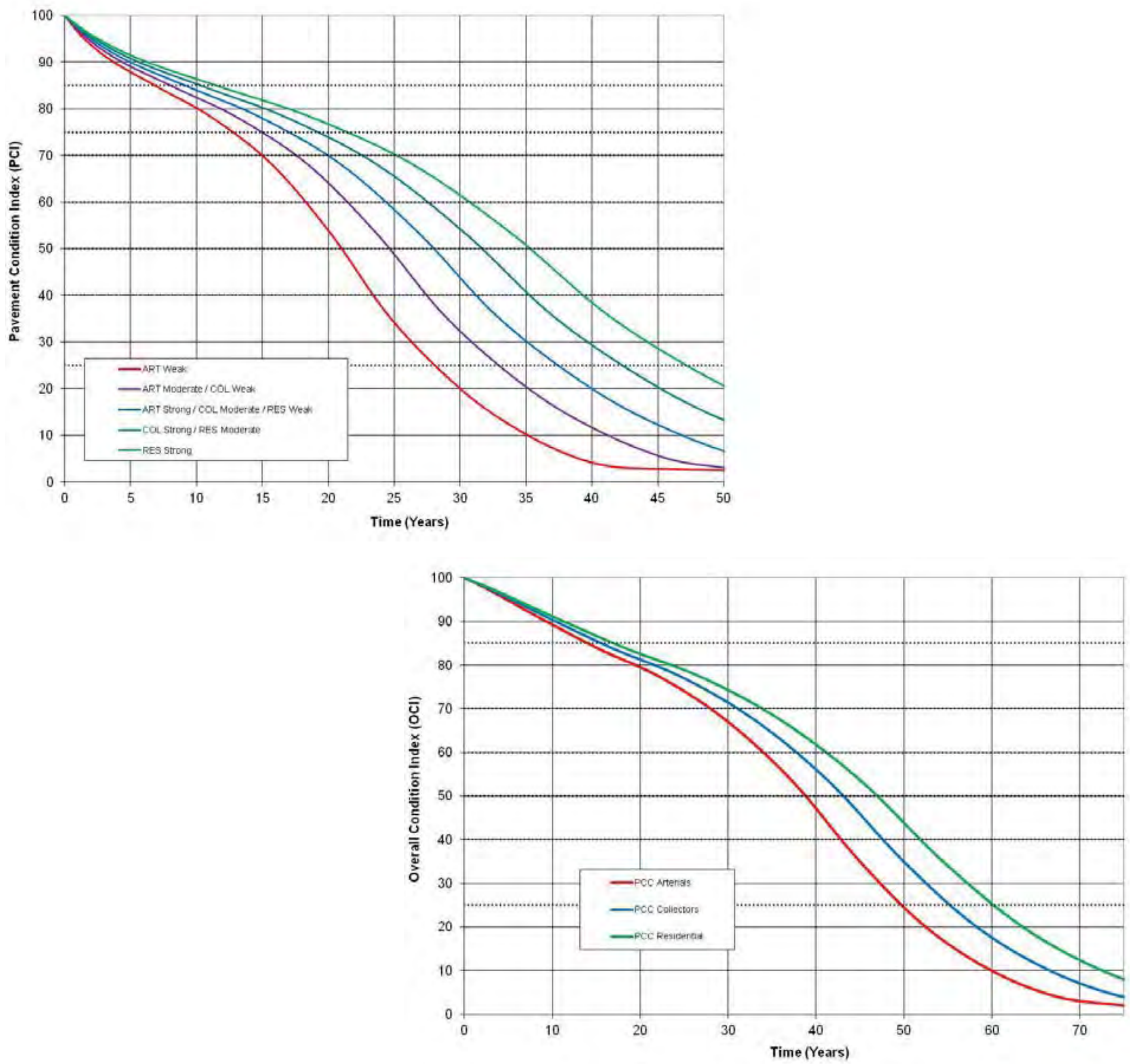


Figure 12 – ACP and PCC Performance Curves

The basic shape of the curves follows traditional sigmoidal performance models such as those contained in MicroPaver and other commonly used pavement management applications.

- **Rehabilitation Strategies and Unit Rates** – The rehab strategies, unit rates, PCI ranges and selection criteria used in the pavement analysis are presented below:

Rehabilitation Strategies and Unit Rates

			PCI Range			Constraint					Unit Rate ($/yd2)		
Rehab Code	Pavement Type	Rehabilitation Activity	Minimum PCI	Critical PCI	Maximum PCI	Minimum Structural Index	Maximum Structural Index	Rehab Selection Order	Reset PCI	Minimum Life (yrs)	Arterials	Collectors	Residentials
10	Asphalt	Slurry Seal	75	77	85			11	90	5	2.25	2.00	1.75
20	Asphalt	Surface Treatment	70	72	75	75	100	10	91	5	3.25	3.00	2.75
21	Asphalt	Surf Treat + RR	70	72	75	0	75	9	91	5	4.00	3.75	3.50
22	Asphalt	Surf Treat + RR 2	60	62	70	75	100	8	91	5	4.00	3.75	3.50
30	Asphalt	Thin Olay	60	62	70	45	75	7	93	5	13.75	12.75	11.75
31	Asphalt	Thin Olay + RR	60	62	70	0	45	6	93	5	14.75	13.75	12.75
32	Asphalt	Thin Olay + RR 2	50	52	60	75	100	5	93	5	14.75	13.75	12.75
40	Asphalt	Moderate Olay	50	52	60	45	75	14	94	5	16.75	15.75	14.75
41	Asphalt	Moderate Olay + RR	50	52	60	0	45	13	94	5	17.75	16.75	15.75
42	Asphalt	Moderate Olay + RR 2	40	43	50	75	100	12	94	5	17.75	16.75	15.75
50	Asphalt	Thick Olay	40	43	50	45	75	3	95	5	19.75	17.75	14.75
51	Asphalt	Thick Olay + RR	40	43	50	0	45	2	95	5	21.00	19.00	15.75
52	Asphalt	Thick Olay + RR 2	25	30	40	75	100	1	95	5	21.00	19.00	15.75
60	Asphalt	Partial Reconstruction	25	30	40	0	75	4	96	5	35.00	30.00	25.00
70	Asphalt	Full Reconstruction	0	10	25			15	100	5	55.00	45.00	35.00
510	Jointed Concrete	Localized PCC Repairs Hi	75	77	85			10	92	5	2.45	2.25	2.00
520	Jointed Concrete	Localized PCC Repairs Lo	70	72	75			9	92	5	4.20	3.60	3.10
530	Jointed Concrete	Localized Panel Replace	60	62	70			14	93	5	17.00	15.00	13.00
540	Jointed Concrete	Moderate Panel Replace	50	52	60			6	94	5	36.00	31.00	26.00
550	Jointed Concrete	Extensive Panel Replace	40	43	50			3	94	5	53.50	43.50	33.50
560	Jointed Concrete	PCC Partial Reconstruct	25	30	40			11	96	5	115.00	100.00	75.00
570	Jointed Concrete	PCC Full Reconstruction	0	10	25			15	100	5	161.00	150.00	125.00

Rehabilitation Activity – is the assigned name to each rehabilitation strategy. The "+ R&R" term refers to remove and replace. When this term is present, additional funds have been assigned to the base strategy to allow for an increased amount of preparation work and patching. The "2" suffix after the name is simply a placeholder to separate one rehabilitation from another within the software.

For the purpose of developing the unit rates the following pavement thicknesses were assumed. The actual thickness of the rehab should be confirmed prior to implementation:

Rehab Activity	ART	COL	RES
Thin Overlay	<2"	<2"	1.5"
Moderate Overlay	2" to 3"	2" to 3"	2"
Thick Overlay	3" to 4"	3"	2"
Partial Reconstructrion	4"	3.5"	3"
Full Reconstruction	4"	3.5"	3"

PCI Range - defines the Pavement Condition Index (PCI) range applicable to the rehab selection. The PCI ranges generally match the Good-Fair-Poor descriptions, but are not required to do so. The PCI range for Residential roadways was set approximately 5 points lower for thick overlays, partial reconstruction and full reconstruction. This was done to reflect their lower traffic and thus the ability to defer rehabilitation slightly.

The Critical PCI is the limit which a segment falling into the range between the Minimum PCI and Critical PCI must be completed in its need year. If the segment is not completed that year, its PCI score will drop below the minimum and require a thicker rehabilitation activity.

Constraint –defines the Structural Index range applicable to the rehabilitation selection. The PCI score defines when rehabilitation is required based on the segments rate of deterioration and the appropriate PCI Range. The Structural Index constraint further defines the rehab selection by identifying whether rehabilitation requires additional activity such as patching if the Structural index is below 45, or if a slightly lighter rehab may be applied of the structural index is above a 75. Figure 13 presents the asphalt pavement rehabilitation strategies overlaid on the plot of Pavement Condition Index (PCI) and the Structural Index.

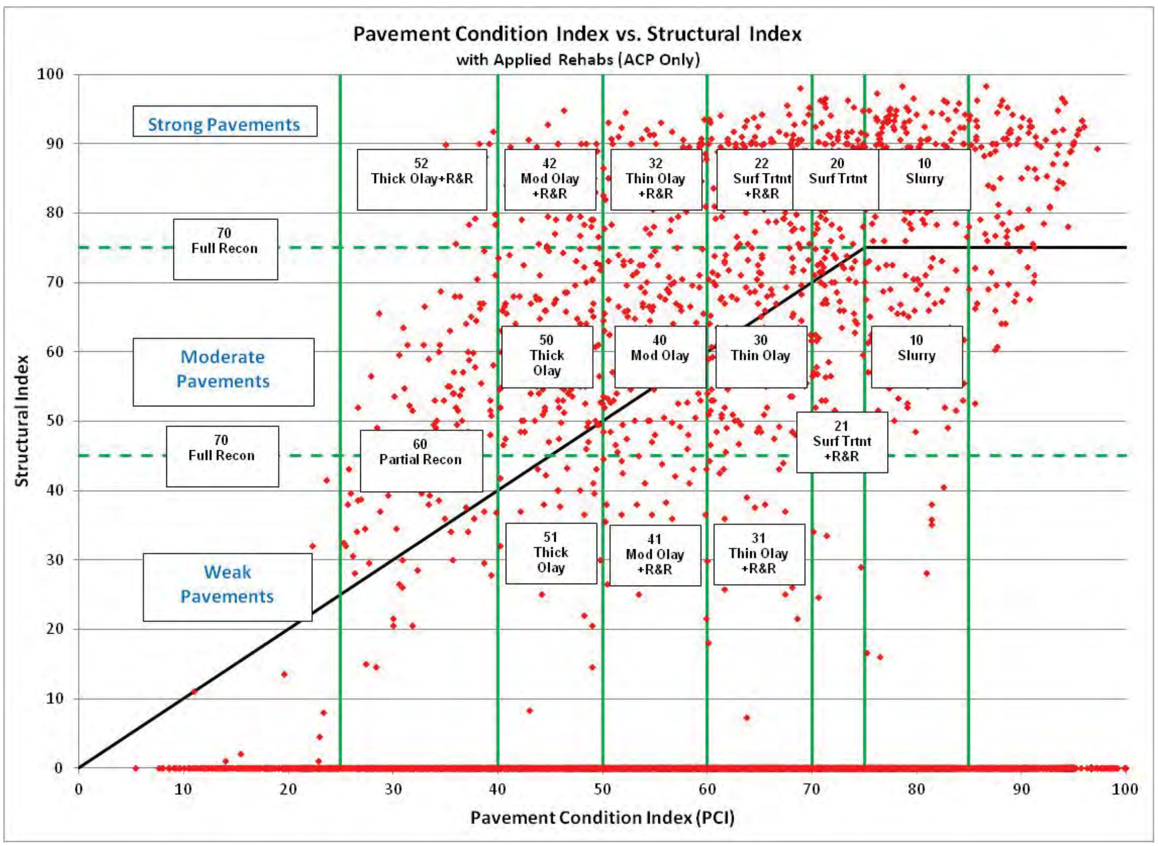


Figure 13 – ACP Rehabs by PCI and Structural Index

For segments with no deflection testing, a Structural Index value was assigned based on the relationship between the PCI score and sum of the Load Associated Distress Deducts. The following plot, Figure 14, graphically presents the application of pavement rehabs for asphalt streets by PCI and Load Associated Distress deducts. Segments below the lower black diagonal line where assigned a structural rating of strong (equal to a Structural Index score of 80). Above the upper black diagonal line, segments were assigned a structural rating of weak with a Structural Index of 35. Between the lines are the moderate streets and were assigned a Structural Index of 60. These values were then used as the constraints in the rehabilitation selection.

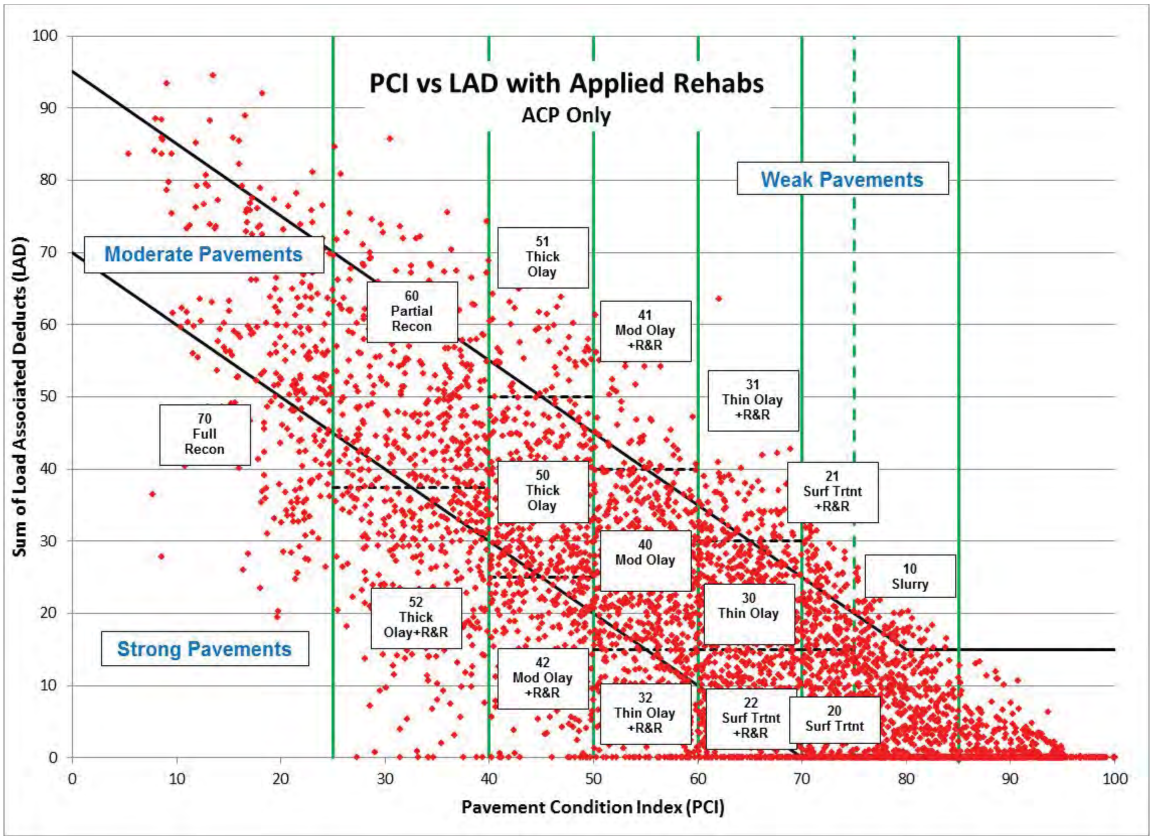


Figure 14 – ACP Rehabs by PCI and LAD

Concrete streets do not have a constraint on the rehab selection as they were not structurally tested, nor does the concept of load associated distresses apply.

Unit Rates – the rehabilitation costs are presented on a per square yard basis for each pavement type–functional class–rehabilitation activity combination. The rates were developed using typical national averages for similar activities and then were adjusted for Las Cruces' location and unique conditions. The rates include an allowance to cover costs for traffic control and site preparation, striping and pavement markings, engineering and inspection, and miscellaneous costs and contingency. The rates do not include ADA compliance costs, landscaping, signals or signage upgrades, or peripheral concrete repairs and in-house costs.

Rehab Selection Order – defines the order in which rehabilitation activities are funded. The software selects the critical segments in the rehab selection order until all available monies are spent. After the critical segments are funded, if funds are still available, the software then recycles through the priority list and selects the remaining segments in order. In practice, available funds are generally expended before all critical segments are selected and segments not selected are deferred.

Reset PCI – defines the post rehab pavement condition index for each rehabilitation activity. If the segment is not selected, the pavement deteriorates following its assigned performance curve.

Minimum Life – defines the number of years a segment is removed from consideration following its selection. Generally the value is set to 5 years – the minimum life a slurry or seal coat. It does not define the actual life cycle of the rehabilitation.

Priority Ranking – The GBA pavement management program incorporates a user defined formula to determine the order in which streets are selected for rehabilitation. The priority formula is as follows:

Priority = (100 – PCI) X PWF, where the PWF is the priority weighting factor as follows:

Pavement Type	Strength	Arterial	Collector	Residential
Asphalt	Weak	1.5	1.4	1.3
	Moderate	1.4	1.3	1.2
	Strong	1.3	1.2	1.1
Concrete	Weak	1.4	1.3	1.2
	Moderate	1.3	1.2	1.1
	Strong	1.2	1.1	1.0

The effect of the PWF is to place an emphasis on weaker asphalt streets with higher functional classes tapering down to stronger concrete residentials.

3.2 FIX ALL AND ANNUAL ESTIMATES

The Fix All estimate is the theoretical value to rehabilitate all streets in the network to identify the magnitude of the current condition deficiency. The estimate is developed to validate the Fix All and Steady State budget analysis and provide direction where rehabilitation budgets are best expended. For Las Cruces, the Fix All Estimate is approximately $110M, broken down as follows:

Rehabilitation Activity	Total Fix All Cost ($)	Life Cycle (yrs)	Annual Life Cycle Cost ($)
Full Reconstruction	17,155,056	40	429,000
Partial Reconstruction	28,068,151	35	802,000
Thick Overlay	18,629,187	17	1,096,000
Moderate Overlay	19,864,935	17	1,169,000
Thin Overlay	20,752,377	17	1,221,000
Surface Treatment	2,541,450	7	363,000
Slurry Seal / Seal Coat	2,852,574	5	571,000
Routine Maintenance	377,500	2	189,000
PCC Localized Pnl Rplcmnt	55,500	25	2,000
PCC Crack Seal & Patch	146,700	5	29,000
Routine Maintenance	1,600	2	1,000
Fix All Estimate:	**110,445,030**	**Annual Budget:**	**5,872,000**

By dividing the Fix All Estimate totals developed above by typical life cycles for each rehab, an annual steady state budget may be developed. For Las Cruces, the steady state budget (that is, maintaining the current PCI) is estimated at $5.8M annually.

Other methods to estimate the annual budget for the network include 1.) dividing the total network value by its depreciation life, and 2.) identifying the network average PCI, assigning an appropriate rehabilitation and then estimating the size of the annual program based on the service life of the average rehabilitation. Both examples are highlighted in the following tables:

Asset Value Divided by Depreciation Life

Network Valuation ($M):	484.0
Ultimate Roadway Depreciation Life (yrs):	75
Annual Budget Based on Depricatied ($M/yr):	**6.45**

Average Life Cycle of Typical Rehabilitation

Pavement Type	**Miles**	**Average PCI**	**Selected Rehab Based on PCI**	**Rehab Design Life (yrs)**	**Annual Program (mi/yrs)**	**Average Rehab Cost ($/mile)**	**Annual Cost ($)**
Asphalt	455.4	63	Thin Overlay	17	26.8	250,000	6,700,000
Concrete	1.8	79	Localized Rehab	5	0.4	62,000	20,000
						Annual Budget Based on Average Design Life ($/yr):	**6,720,000**

These three methods all based on the size and condition of the Las Cruces network all point to an annual budget on the order of $6.0M.

3.3 NETWORK BUDGET ANALYSIS MODELS

A total of 7 budget runs ranging from $2.00M per year up to $8.00M per year plus the Do Nothing and Fix All (Unlimited) options were prepared for the Las Cruces network in order to fine tune the analysis process and identify optimum expenditures. The budget analysis results are summarized below:

Fix All – The Fix All budget is similar to the Fix All Estimate discussed above in that it provides sufficient funding to rehabilitate each street in its need year with sufficient funds available. The idea is to identify the upper limit of spending over 5 years the City would require if they had unlimited funds. The budget analysis is for reference only and used to calibrate the analysis models. The Fix All budget increases the PCI to 92 tapering off to an 87 in five years and expends $108M – which is on the same order or magnitude as the Fix All Estimate.

Do Nothing – this option identifies the effect of spending no capital for 5 years. After 5 years, the Do Nothing option results in a PCI drop from a 62 to a 52.

$2.0M, $3.00M, $4.0M, $6.0M and $8.0M – identifies the resultant network PCI at various funding levels.

The software selects the rehabilitation candidates based on their priority and rehab selection order – starting with thick overlays. At funding levels below the estimated steady state value, only critical segments are selected – and even then many are deferred due to lack of funding. Depending of the level of the funding shortfall, some segments are never selected and eventually become fall through segments due to their low priority.

As the funding level becomes closer to the steady state budget, the software is able to select most of critical segments within a five year period. When funding is at the steady state budget, the PCI remains fairly constant, and over time, the backlog is able to be reduced. Funding levels above the steady state, allow for increases in PCI and decrease in backlog at an accelerated rate.

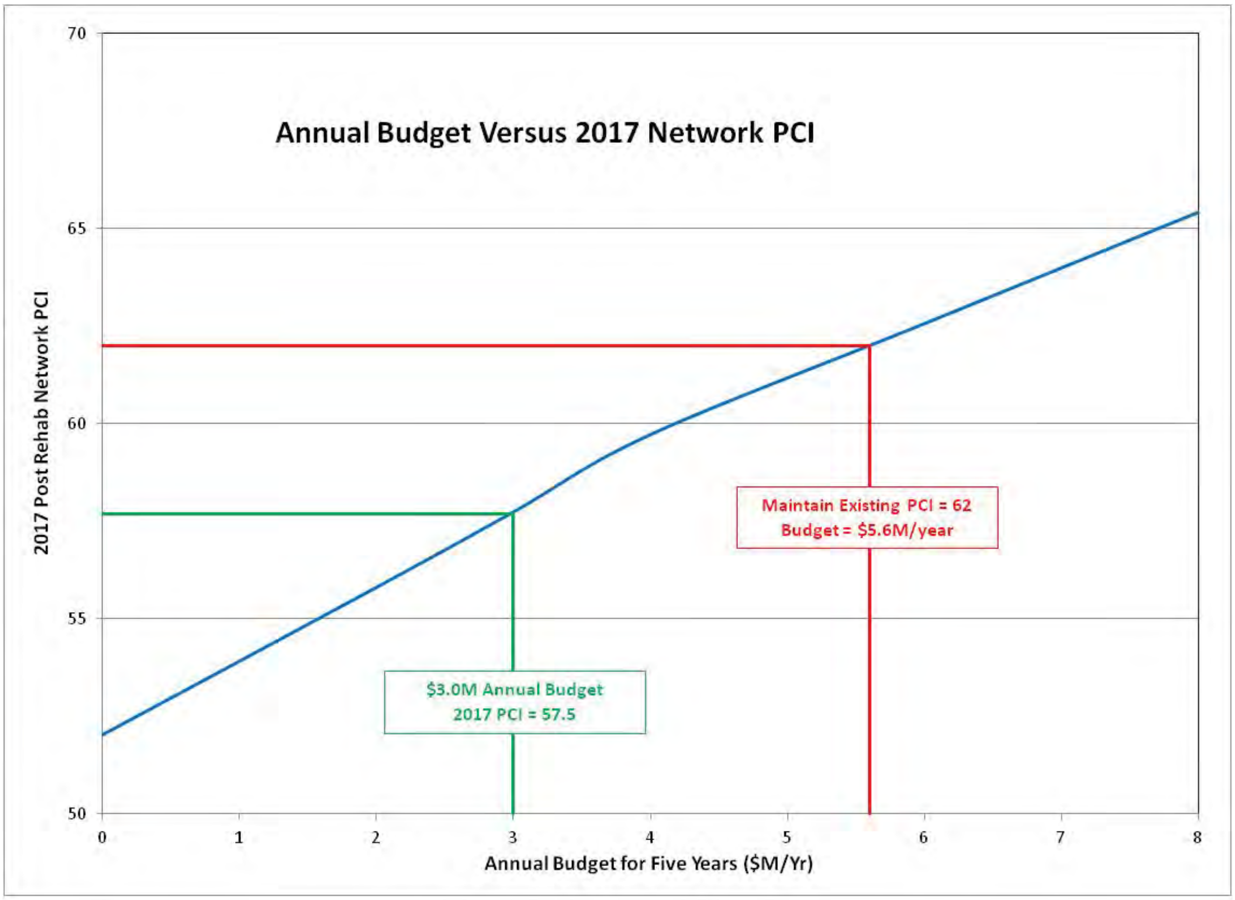


Figure 15 – Five Year Network PCI Analysis Results

The results of the analysis are summarized in Figure 15. The X axis highlights the annual budget, while the Y axis plots the 5 year Network Post Rehab PCI value. The diagonal blue line is the analysis results.

The targets for the pavement analysis are to maintain the network PCI at its current level of 62, while attempting to reduce the backlog to as close to 15% as possible. Currently, the backlog is approximately17.5%. As can be seen from Figure 15, a budget of $5.6M would maintain the current PCI. The $5.6M budget varies slightly from the Life cycle cost estimate of $5.8M due to efficiency of street selection within the pavement management system and ongoing aging of the network.

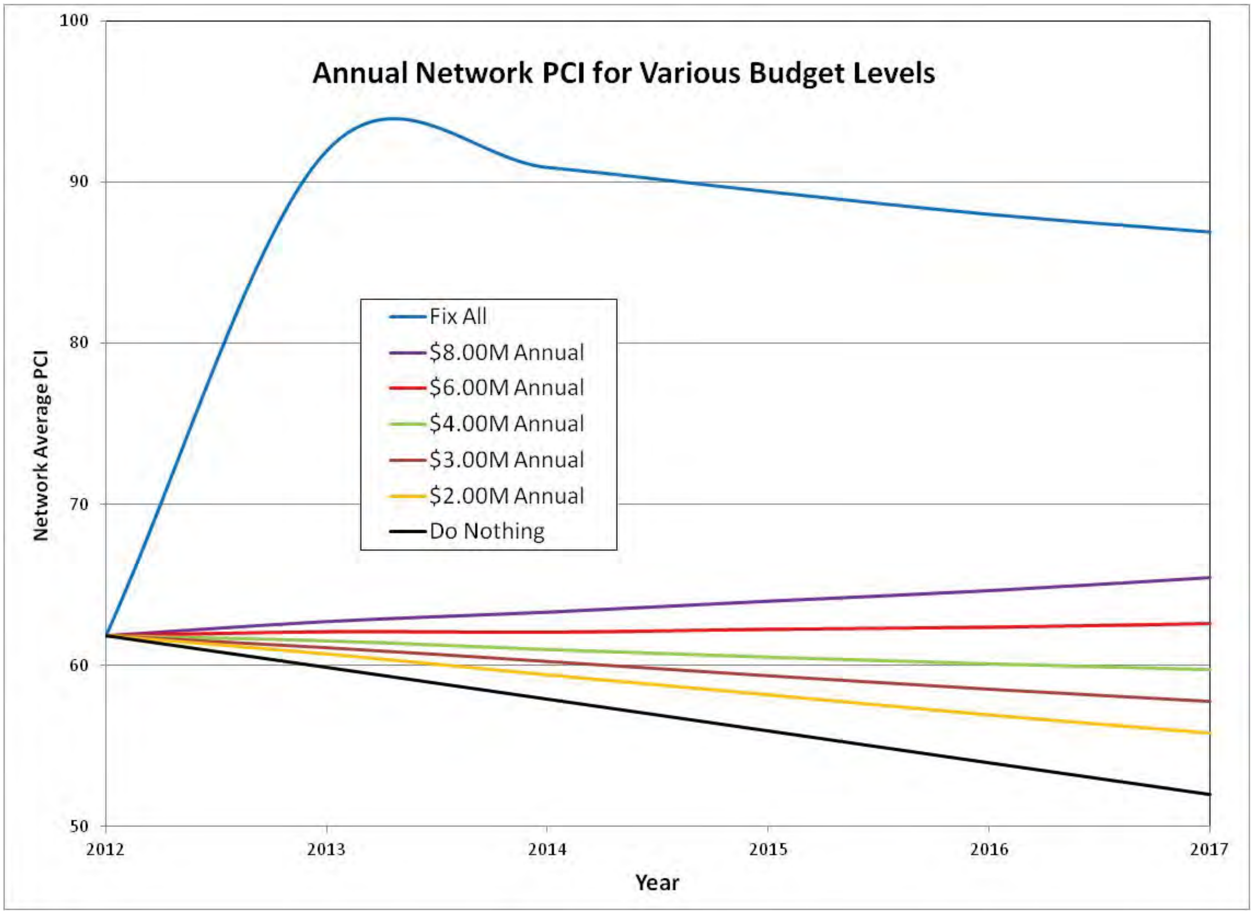
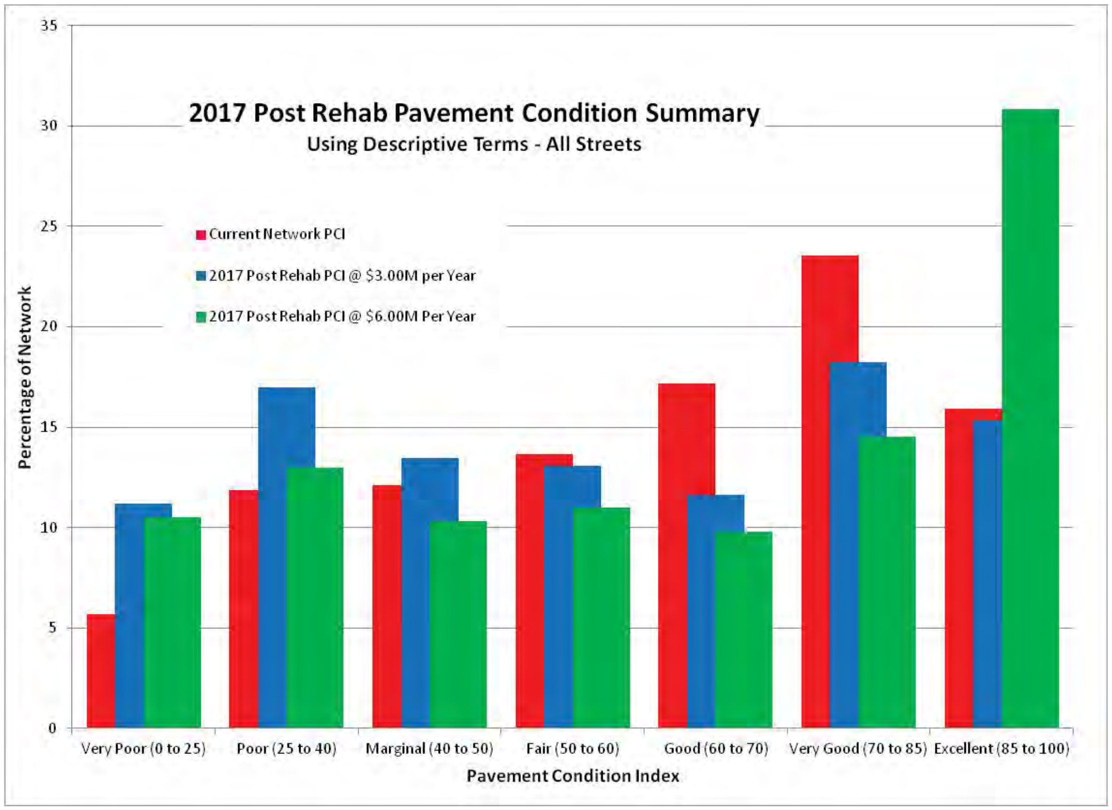


Figure 16 – Five Year Annual PCI

Figure 16 presents the same analysis results on an annual basis. The $6.0M budget is close to the actually steady state requirement of $5.6M and highlights that funding amounts below this level will drop the network PCI over time.

The other half of the analysis target is to reduce the backlog to as close to 15% as possible. Figure 17 compares the five year and ten year (2017 and 2022) PCI distribution for the $3.0M and $6.0 budget options against the current network profile. By 2017, the backlogs for both budgets exceed the 20% guideline, and in the case of the $3.0M budget increases it to 28%. It is not until 10 years that the $6.00M annual budget gets the backlog under control (approximately 16%) while maintaining the PCI above 62. By 2002 the $3.00M budget backlog has grown to just under one third of the network.



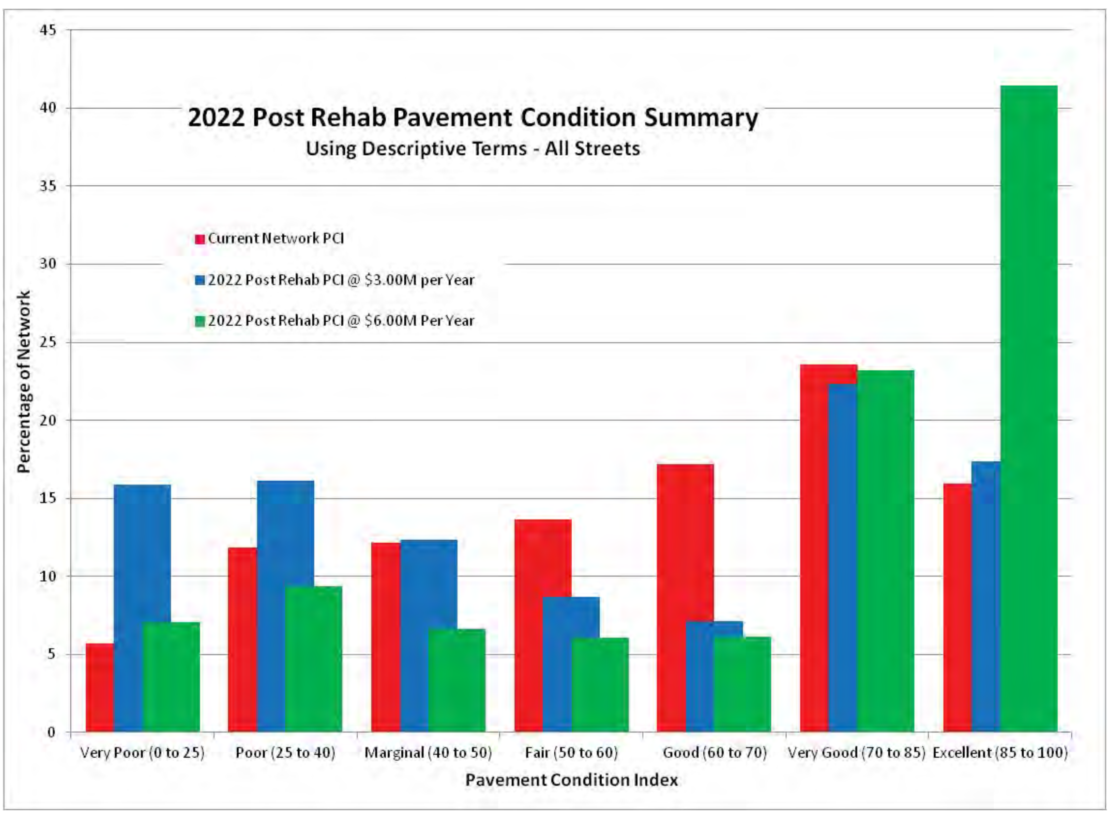


Figure 17 – 2017 and 2022 Post Rehab PCI Distribution

3.4 NETWORK RECOMMENDATIONS AND COMMENTS

The following recommendations are presented to the City of Las Cruces and must be read in conjunction with the attached reports.

1. The City should adopt a policy statement identifying the desired overall pavement condition rating and acceptable amount of backlog. We suggest a PCI target that maintains the current network profile on the order of 62, while checking any increase in backlog and then over time, reducing it to below 15%.

   An annual budget of $6.0M is required to achieve both of these goals within a 5 year horizon for the PCI and 10 year horizon for the backlog.

2. The cost savings benefits of following the $6.0M steady state recommendations may be demonstrated by comparing the results of the steady state budget against the Do Nothing option and various levels of funding below $6.0M/yr. For the purpose of illustration, the network average PCI may be considered as equity or value of the system. New streets have a PCI of 100 and as they age they deteriorate in quality – thus they drop in value and this can be considered as removal of equity form the network. At some point in time, the deteriorated streets must be rehabilitated and this is then the cost to replace the equity lost over time.

   The current PCI is 62, this score increases to an 87 after 5 years following the Fix All budget at an expenditure of $108M. By dividing the $108M by the Fix All PCI gain of 25 points yields approximately $4.31M/point gain. This becomes the theoretical cost to replace equity removed from the system as a result of deterioration through underfunding.

   The following table illustrates the effects of removing equity from the network by underfunding and then rebuilding the system versus maintaining the network PCI. With a $2M annual budget, the network PCI will deteriorate to 56 after 5 years representing a 6 point PCI drop. The cost to replace this equity is $25.9M (6 points times $4.31M/point = $25.9M). Add to this value the 5 year expenditure of $10M (= 5 x $2M) and the total cost to the city equals $35.9M. The steady state cost – that is, the cost to maintain the PCI at 62 is only $30M for a difference of $5.9M.

		Annual Budget		
	Do Nothing	**$2.0M**	**$3.0M**	**Comment**
2011 PCI	62	62	62	From 2011 survey
Fix All PCI	87	87	87	From Fix All analysis results
PCI Increase	25	25	25	
Fix All Cost	108	108	108	From Fix All analysis results
Cost per PCI Point Increase	**4.31**	**4.31**	**4.31**	**($M/pt) = Cost of Equity Removal per point**
2011 PCI	62	62	62	From 2011 survey
2017 PCI	52	56	58	From analysis results
PCI Drop	10	6	4	
Cost To Replace Equity Removed	42.2	25.9	17.6	PCI Drop x Cost/point to replace equity
5 Year Total Expenditure	0.0	10.0	15.0	Annual budget x 5 Years
Total Cost to Agency	42.2	35.9	32.6	= Equity Removal + Annual Budget
5 Year Steady State Cost	30.0	30.0	30.0	Annual steady state budget x 5 years
Agency Net Loss	**12.2**	**5.9**	**2.6**	**Net loss over 5 years ($M)**

3. The full suite of proposed rehabilitation strategies and unit rates should be reviewed annually as these can have considerable effects on the final program.

4. All costs are in constant 2011 dollars. No allowances have been made for inflation or fluctuations in rehabilitation costs. The City will have to monitor and factor in inflation for each budget year.

5. No allowance has been made for network growth or conversion of gravel roadways to pavement. As the City expands or increases the amount of paved roads, increased budgets will be required.

6. No allowance has been made for routine maintenance activities such as crack sealing, sweeping, striping or patching. These costs are assumed to be outside the pavement management costs.

7. No allowance has been made for compliance with the Americans with Disabilities Act, which is required on all roadway rehabilitation projects.

APPENDIX C –

RECORDING AND CODING GUIDE FOR THE STRUCTURE INVENTORY AND APPRAISAL OF THE NATION'S BRIDGES

National Bridge Inventory [NBI] - Data Dictionary

NBI Elements

Item #	Description	Item #	Description
1	State Code	55	Minimum Lateral Underclearance on Right
2	Highway Agency District	56	Minimum Lateral Underclearance on Left
3	County (Parish) Code	58	Deck Condition Rating
4	Place Code	59	Superstructure Condition Ratings
5	Inventory Route	60	Substructure Condition Ratings
6	Features Intersected	61	Channel and Channel Protection
7	Facility Carried by Structure	62	Culverts Condition Ratings
8	Structure Number	63	Method used to Determine Operating Rating
9	Location	64	Operating Rating
10	Inventory Route, Minimum Vertical Clearance	65	Method used to Determine Inventory Rating
11	Kilometer Point	66	Inventory Rating
12	Base Highway Network	67	Structural Evaluation Appraisal Ratings
13	LRS Inventory Route, Subroute Number	68	Deck Geometry Appraisal Ratings
19	Bypass, Detour Length	69	Underclearances, Vertical and Horizontal Appraisal Ratings
20	Toll	70	Bridge Posting
21	Maintenance Responsibility	71	Waterway Adequacy Appraisal Ratings
22	Owner	72	Approach Roadway Alignment Appraisal Ratings
26	Functional Classification of Inventory Route	75	Type of Work
27	Year Built	76	Length of Structure Improvement
28	Lanes On and Under the Structure	90	Inspection Date
29	Average Daily Traffic	91	Designated Inspection Frequency
30	Year of Average Daily Traffic	92	Critical Feature Inspection
31	Design Load	93	Critical Feature Inspection Date
32	Approach Roadway Width	94	Bridge Improvement Cost
33	Bridge Median	95	Roadway Improvement Cost
34	Skew	96	Total Project Cost
35	Structure Flared	97	Year of Improvement Cost Estimate
36	Traffic Safety Features	98	Border Bridge
37	Historical Significance	99	Border Bridge Structure Number
38	Navigation Control	100	STRAHNET Highway Designation
39	Navigation Vertical Clearance	101	Parallel Structure Designation
40	Navigation Horizontal Clearance	102	Direction of Traffic
41	Structure Open, Posted or Closed to Traffic	103	Temporary Structure Designation
42	Type of Service	104	Highway System of the Inventory Route
43	Structure Type, Main	105	Federal Lands Highways
44	Structure Type, Approach Spans	106	Year Reconstructed
45	Number of Spans in Main Unit	107	Deck Structure Type
46	Number of Approach Spans	108	Wearing Surface/Protective System
47	Inventory Route, Total Horizontal Clearance	109	Average Daily Truck Traffic
48	Length of Maximum Span	110	Designated National Network
49	Structure Length	111	Pier or Abutment Protection [for navigation]
50	Curb or Sidewalk Widths	112	NBIS Bridge Length
51	Bridge Roadway Width, Curb-to-Curb	113	Scour Critical Bridges
52	Deck Width, Out-to-Out	114	Future Average Daily Traffic
53	Minimum Vertical Clearance Over Bridge Roadway	115	Year of Future Average Daily Traffic
54	Minimum Vertical Underclearance	116	Minimum Navigation Vertical Clearance

DEC_AREA
FIPS
FUNCT_OBS
STATUS
STRUCT_DEF
SUFF_RAT

NBI Elements > ITEM 1 - State Code: 2 - Digit FIPS only

Code	Description
01	Alabama
02	Alaska
04	Arizona
05	Arkansas
06	California
08	Colorado
09	Connecticut
10	Delaware
11	District of Columbia
12	Florida
13	Georgia
15	Hawaii
16	Idaho
17	Illinois
18	Indiana
19	Iowa
20	Kansas
21	Kentucky
22	Louisiana
23	Maine
24	Maryland
25	Massachusetts
26	Michigan
27	Minnesota
28	Mississippi
29	Missouri
30	Montana
31	Nebraska
32	Nevada
33	New Hampshire
34	New Jersey
35	New Mexico
36	New York
37	North Carolina
38	North Dakota
39	Ohio
40	Oklahoma
41	Oregon
42	Pennsylvania
44	Rhode Island
45	South Carolina
46	South Dakota
47	Tennessee
48	Texas

49	Utah
50	Vermont
51	Virginia
53	Washington
54	West Virginia
55	Wisconsin
56	Wyoming
60	American Samoa
66	Guam
69	Northern Marianas
72	Puerto Rico
78	Virgin Islands

NBI Elements > ITEM 2 - Highway Agency District

The highway agency district (State or Federal) in which the bridge is located represented by a 2-digit code.

NBI Elements > ITEM 4 - Place Code

Cities, towns, townships, villages, and other census-designated places identified using the FIPS codes given
in the current version of the Census of Population and Housing - Geographic Identification Code Scheme.

NBI Elements > ITEM 5 - Inventory Route

The inventory route is a 9-digit code composed of 5 segments.

Length	Segment	Description
1 digit	5A	Record Type
1 digit	5B	Route Signing Prefix
1 digit	5C	Designated level of service
5 digit	5D	Route Number
1 digit	5E	Directional Suffix

NBI Elements > ITEM 5A - Record Type

There are 2 types of NBI records: "ON" and "UNDER".

Code	Description
1	Route carried "ON" the structure
2	Single route goes "UNDER" the sturcture
A - Z	Multiple routes go "UNDER" the structure
99	Miscoded data

NBI Elements > ITEM 5B - Record Signing Prefix

Code	Description
1	Interstate highway
2	U.S. numbered highway

3	State highway
4	County highway
5	City street
6	Federal lands road
7	State lands road
8	Other
99	Miscoded data

NBI Elements > ITEM 5C - Designated Level of Service

Code	Description
0	None of the below
1	Mainline
2	Alternate
3	Bypass
4	Spur
6	Business
7	Ramp, Wye, Connector, etc.
8	Service and/or unclassified frontage road
99	Miscoded data

NBI Elements > ITEM 5D - Route Number

The route number of inventory route in 5 digits, right justified with leading zeros.

NBI Elements > ITEM 5E - Directional Suffix

Code	Description
0	N/A
1	North
2	East
3	South
4	West
99	Miscoded data

NBI Elements > ITEM 6A - Features Intersected / ITEM 6B - Critical Facility Indicator

These items contain the description of the features intersected by the structure and a critical facility indicator(no longer coded).

NBI Elements > ITEM 7 - Facility Carried by Structure

The facility being carried by the structure. In all situations this item describes the use "on" the structure.

NBI Elements > ITEM 8 - Structure Number

A 15 digit structure number unique for each bridge within the state.

NBI Elements > ITEM 9 - Location

A narrative description of the bridge location.

NBI Elements > ITEM 10 - Inventory Route, Minimum Vertical Clearance

The minimum vertical clearance over the inventory route identified in Item 5, whether the route is "on" the structure
or "under" the structure. Measured **in meters**.

NBI Elements > ITEM 11 - Kilometerpoint

The linear referencing system(LRS) kilometerpoint is used to establish the location of the bridge on the
Base Highway Network(Item 12).

NBI Elements > ITEM 12 - Base Highway Network

The Base Highway Network includes the through lane(mainline) portions of the NHS, rural/urban principal arterial system
and rural minor arterial system. Ramps, frontage roads and other roadways are not included in the Base Network.

Code	Description
0	Inventory route **is not** on the Base Network
1	Inventory route **is** on the Base Network
99	Miscoded data

NBI Elements > ITEMS 13A, 13B - LRS Inventory Route, Subroute Number

If Item 12 - Base Highway Network has been coded 1, the information to be recorded for this item is inventory route for
the State's linear referencing system(LRS). If Item 12 has been coded 0, this entire item is left blank.

NBI Elements > ITEM 19 - Bypass, Detour Length

The actual length to the nearest kilometer of the detour length. It is the total additional travel for a vehicle
which would result from closing of the bridge.

NBI Elements > ITEM 20 - Toll

Code	Description
1	Toll bridge. Tolls are paid specifically to use the structure.
2	On toll road. The structure carries a toll road, i.e. tolls are paid to the facility, which includes both the highway and the structure.
3	On free road. The structure is toll-free and carries a toll-free highway.
4	On Interstate toll segment under Secretarial Agreement. Structure functions as a part of the toll segment.
5	Toll bridge is a segment under Secretarial Agreement. Structure is seperate agreement from highway segment.
99	Miscoded data

NBI Elements > ITEMS 21, 22 - Maintenance Responsibility / Owner

Code	Description
01	State Highway Agency
02	County Highway Agency
03	Town or Township Highway Agency
04	City or Municipal Highway Agency
11	State Park, Forest, or Reservation Agency
12	Local Park, Forest, or Reservation Agency
21	Other State Agencies
25	Other Local Agencies
26	Private (other than railroad)
27	Railroad 31 State Toll Authority
32	Local Toll Authority
60	Other Federal Agencies (not listed below)
61	Indian Tribal Government
62	Bureau of Indian Affairs
63	Bureau of Fish and Wildlife
64	U.S. Forest Service
66	National Park Service
67	Tennessee Valley Authority
68	Bureau of Land Management
69	Bureau of Reclamation
70	Corps of Engineers (Civil)
71	Corps of Engineers (Military)
72	Air Force
73	Navy/Marines
74	Army
75	NASA
76	Metropolitan Washington Airports Service
80	Unknown
99	Miscoded data

NBI Elements > ITEM 26 - Functional Classification of Inventory Route

Code	Description
Rural	

01	Principal Arterial - Interstate
02	Principal Arterial - Other
06	Minor Arterial
07	Major Collector
08	Minor Collector
09	Local
Urban	
11	Principal Arterial - Interstate
12	Principal Arterial - Other Freeways or Expressways
14	Other Principal Arterial
16	Minor Arterial
17	Collector
19	Local
99	Miscoded data

NBI Elements > ITEM 27 - Year Built

Year of construction of the structure.

NBI Elements > ITEMS 28A, 28B - Lanes On and Under the Structure

Number of lanes being carried by the structure and being crossed over by the structure.

NBI Elements > ITEM 29 - Average Daily Traffic

Average daily traffic volume for the inventory route identified in Item 5.

NBI Elements > ITEM 30 - Year of Average Daily Traffic

Year represented by the ADT(Item 29).

NBI Elements > ITEM 31 - Design Load

Code	Metric / English Description
1	M 9 / H 10
2	M 13.5 / H 15
3	MS 13.5 / HS 15
4	M 18 / H 20
5	MS 18 / HS 20
6	MS 18+Mod / HS 20+Mod
7	Pedestrian
8	Railroad
9	MS 22.5 / HS 25
0	Other or Unknown
99	Miscoded data

NBI Elements > ITEM 32 - Approach Roadway Width

Normal width of usable roadway approaching the structure measured **in meters**.

NBI Elements > ITEM 33 - Bridge Median

Code	Description
0	No median
1	Open median
2	Closed median(no barriers)
3	Closed median with non-mountable barriers
99	Miscoded data

NBI Elements > ITEM 34 - Skew

The skew angle is the angle between the centerline of a pier and a line normal to the roadway centerline.
Major variation in skews of substructure units is indicated with 99.

NBI Elements > ITEM 35 - Structure Flared

Flared = width of structure varies.

Code	Description
0	No flare
1	Yes, flared
99	Miscoded data

NBI Elements > ITEM 36 - Traffic Safety Features

Bridge inspection shall include the recording of information on the following traffic safety features so that the evaluation of their adequacy can be made.

Segment	Description
36A	Bridge railings
36B	Transitions
36C	Approach guardrail
36D	Approach guardrail ends

The reporting of these features shall be as follows:

Code	Description
0	Inspected feature does not meet currently acceptable stds. or a safety feature is required and none is provided.*
1	Inpected peature meets currently acceptable standards.*
N	Not applicable or a safety feature is not required.*
99	Miscoded data

* For structures on the NHS, national standards are set by regulation. For those not on the NHS, it shall be
the responsibility of the highway agency (state, county, local or federal) to set standards.

NBI Elements > ITEM 37 - Historical Significance

Code **Description**
1 Bridge is on the National Register of Historic Places(NRHP).
2 Bridge is eligible for the NRHP.
3 Bridge is possibly eligible for the NRHP(requires further investigation before determination can be made)
or bridge is on a State or local historic register.
4 Historical significance is not determinable at this time.
5 Bridge is not eligible for the NRHP.

99 Miscoded data

NBI Elements > ITEM 38 - Navigation Control

Code **Description**
N Not applicable, no waterway.
0 No navigation control on waterway(bridge permit not required).
1 Navigation control on waterway(bridge permit required).

99 Miscoded data

NBI Elements > ITEM 39 - Navigation Vertical Clearance

If Item 38 - Navigation Control has been coded 1, clearance is the minimum vertical clearance imposed at the site as
measured above a datum that is specified on a navigation permit issued by a control agency. Measured **in meters**.

NBI Elements > ITEM 40 - Navigation Horizontal Clearance

If Item 38 - Navigation Control has been coded 1, clearance is the horizontal clearance imposed at the site that is shown
on the navigation permit. Measured **in meters**.

NBI Elements > ITEM 41 - Structure Open, Posted or Closed to Traffic

Code **Description**
A Open, no restriction
B Open, posting recommended but not legally implemented (all signs not in place or not correctly implemented)
D Open, would be posted or closed except for temporary shoring, etc. to allow for unrestricted traffic
E Open, temporary structure in place to carry legal loads while original structure is closed and awaiting
replacement or rehabilitation
G New structure not yet open to traffic
K Bridge closed to all traffic
P Posted for load (may include other restrictions such a temporary bridges which are load posted)

R	Posted for other load-capacity restriction (speed, number of vehicles on bridge, etc.)
99	Miscoded data

NBI Elements > ITEMS 42A, 42B - Type of Service On / Under bridge

Type of Service On Bridge

Code	**Description**
1	Highway
2	Railroad
3	Pedestrian-bicycle
4	Highway-railroad
5	Highway-pedestrian
6	Overpass structure at an interchange or second level of a multilevel interchange
7	Third level (Interchange)
8	Fourth level (Interchange)
9	Building of plaza
0	Other
99	Miscoded data

Type of Service under Bridge

Code	**Description**
1	Highway, with or without pedestrian
2	Railroad
3	Pedestrian-bicycle
4	Highway-railroad
5	Waterway
6	Highway-waterway
7	Railroad-waterway
8	Highway-waterway-railroad
9	Relief for waterway
0	Other
99	Miscoded data

NBI Elements > ITEMS 43A, 44A - Kind of material, Main / Approach

Code	**Description**
1	Concrete
2	Concrete continuous
3	Steel
4	Steel continuous
5	Prestressed concrete *
6	Prestressed concrete continuous *
7	Wood or timber
8	Masonry
9	Aluminum, Wrought Iron or Cast Iron
0**	Other
99	Miscoded data

* Post-tensioned concrete coded as prestressed concrete

** Not applicable for Item 44

NBI Elements > ITEMS 43B, 44B - Type of Design, Main / Approach

Code	Description
01	Slab
02	Stringer/Multi-beam or girder
03	Girder and floorbeam system
04	Tee beam
05	Box beam or girders - Multiple
06	Box Beam or girders - Single or Spread
07	Frame
08	Orthotropic
09	Truss - Deck
10	Truss - Thru
11	Arch - Deck
12	Arch - Thru
13	Suspension
14	Stayed girder
15	Movable - Lift
16	Movable - Bascule
17	Movable - Swing
18	Tunnel
19	Culvert
20*	Mixed types
21	Segmental box girder
22	Channel beam
00**	Other
99	Miscoded data

* Applicable to only approach spans - Item 44.
** Not applicable for Item 44

NBI Elements > ITEM 45 - Number of Spans in Main Unit

Number of spans in the main or major unit.

NBI Elements > ITEM 46 - Number of Approach Spans

Number of spans in the approach spans to the major bridge, or the number of spans of material different
from that of the major bridge.

NBI Elements > ITEM 47 - Inventory Route, Total Horizontal Clearance

The total horizontal clearance for the inventory route identified in Item 5 measured **in meters**. It is the available
clearance measured between the restrictive features -- curbs, rails, walls, piers or other structural features limiting the

roadway (surface and shoulders). When the restriction is 100 meters or greater, code could be 999.

NBI Elements > ITEM 48 - Length of Maximum Span

The length of maximum span. It shall be noted whether the measurement is center of bearing points or clear open distance between
piers, bents or abutments. The measurement shall be along the centerline of the bridge. Measured **in meters**.

NBI Elements > ITEM 49 - Structure Length

The length of the structure measured **in meters**. This shall be the length of roadway which is supported on the bridge structure.
The length is measured back to back of backwalls of abutments or from paving notch to paving notch. Culvert lengths are measured along
the center line of roadway regardless of their depth below grade. Measurement is made between inside faces of exterior walls. Tunnel
length is measured along the centerline of the roadway.

NBI Elements > ITEMS 50A, 50B - Curb or Sidewalk Widths (Left / Right)

The widths of the left and right curbs or sidewalks measured **in meters**. "Left" and "Right" is determined on the basis of
direction of the inventory.

NBI Elements > ITEM 51 - Bridge Roadway Width, Curb-to-Curb

The most restrictive minimum distance between curbs or rails on the structure roadway measured **in meters**.

NBI Elements > ITEM 52 - Deck Width, Out-to-Out

The out-to-out width measured **in meters**.

NBI Elements > ITEM 53 - Minimum Vertical Clearance Over Bridge Roadway

The actual minimum vertical clearance over the bridge roadway, including shoulders, to any superstructure restriction,
measured **in meters**. When no superstructure restriction exists above the bridge roadway, or when a restriction
is 30 meters or greater, indicated as **99.99**.

NBI Elements > ITEM 54A - Minimum Vertical Underclearance - Reference feature

The reference feature from which the clearance measurement is taken:

Code	**Description**
H	Highway beneath structure
R	Railroad beneath structure
N	Feature not a highway or railroad
99	Miscoded data

[NBI Elements] > ITEM 54B - Minimum Vertical Underclearance

The minimum vertical clearance from the roadway(travel lanes only) or railroad track beneath the structure to the
underside of the superstructure. Measured **in meters**.

[NBI Elements] > ITEM 55A - Minimum Lateral Underclearance - Reference feature

The reference feature from which the clearance measurement is taken:

Code	**Description**
H	Highway beneath structure
R	Railroad beneath structure
N	Feature not a highway or railroad
99	Miscoded data

[NBI Elements] > ITEM 55B - Minimum Lateral Underclearance on Right

The minimum lateral underclearance on the right measured **in meters**.

[NBI Elements] > ITEM 56 - Minimum Lateral Underclearance on Left

The minimum lateral underclearance on the left measured **in meters**.

[NBI Elements] > ITEMS 58, 59, 60 - Condition ratings: Deck, Superstructure, Substructure

Code	**Description**
N	NOT APPLICABLE
9	EXCELLENT CONDITION
8	VERY GOOD CONDITION - no problems noted.
7	GOOD CONDITION - some minor problems.
6	SATISFACTORY CONDITION - structural elements show some minor deterioration.
5	FAIR CONDITION - all primary structural elements are sound but may have minor section loss, cracking,

spalling or scour.

4 POOR CONDITION - advanced section loss, deterioration, spalling or scour.

3 SERIOUS CONDITION - loss of section, deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present.

2 CRITICAL CONDITION - advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.

1 "IMMINANT" FAILURE CONDITION - major deterioration or section loss present in critical sructural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.

0 FAILED CONDITION - out of service; beyond corrective action.

99 Miscoded data

NBI Elements > ITEM 61 - Channel and Channel Protection

Code	Description
N	Not applicable.
9	There are no noticeable or noteworthy deficiencies which affect the condition of the channel.
8	Banks are protected or well vegetated. River control devices such as spur dikes and embankment protection are not required or are in a stable condition.
7	Bank protection is in need of minor repairs. River control devices and embankment protection have a little minor damage. Banks and/or channel have minor amounts of drift.
6	Bank is beginning to slump. River control devices and embankment protection have widespread minor damage. There is minor stream bed movement evident. Debris is restricting the channel slightly.
5	Bank protection is being eroded. River control devices and/or embankment have major damage. Trees and brush restrict the channel.
4	Bank and embankment protection is severely undermined. River control devices have severe damage. Large deposits of debris are in the channel.

3 Bank protection has failed. River control devices have been destroyed. Stream bed aggradation, degradation or lateral movement has changed the channel to now threaten the bridge and/or approach roadway.

2 The channel has changed to the extent the bridge is near a state of collapse.

1 Bridge closed because of channel failure. Corrective action may put back in light service.

0 Bridge closed because of channel failure. Replacement necessary.

99 Miscoded data

NBI Elements > ITEM 62 - Culverts

Code **Description**

N Not applicable. Used if structure is not a culvert.

9 No defeciencies

8 No noticeable or noteworthy deficiencies which affect the condition of the culvert. Insignificant scrape marks caused by drift.

7 Shrinkage cracks, light scaling and insignificant spalling which does not expose reinforcing steel. Insignificant damage caused by drift with no misalignment and not requiring corrective action. Some minor scouring has occured near curtain walls, wingwalls or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.

6 Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.

5 Moderate to major deterioration or disintegration, extensive cracking and leaching or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting.

4 Large spalls, heavy scaling, wide cracks, considerable efflorescence or opened construction joint permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting.

3 Any condition described in Code 4 but which is excessive in scope. Severe movement or differential setlement of the segments or loss of fill. Holes may exist in walls or slabs. Integral wingwalls nearly severed from culvert. Severe scour or erosion at curtain walls, wingwalls or pipes. Metal culverts have extreme distortion and delection in one section, extensive corrosion, or deep pitting with scattered perforations.

2 Integral wingwalls collapsed, severe settlement of roadway due to loss of fill. Section of culvert may have failed and can no longer support embankment. Complete undrmining at curtain walls and pipes. Corrective action required to maintain traffic. Metal culverts have extreme distortion and deflection and deflection throughout with extensive perforations due to corrosion.

1 Bridge closed. Corrective action may put back in light service.

0 Bridge closed. Replacement necessary.

99 Miscoded data

NBI Elements > ITEMS 63, 65 - Method Used to Determine: Operating Rating / Inventory Rating

Code	Description
1	Load Factor(LF)
2	Allowable Stress(AS)
3	Load and Resistance Factor(LRFR)
4	Load Testing
5	No rating analysis performed
99	Miscoded data

NBI Elements > ITEM 64 - Operating Rating

This capacity rating referred to as the operating rating, will result in the absolute maximum permissible load level to which the structure may be subjected for the vehicle type used in the rating. Represents the total mass of the entire vehicle measured **in metric tons**. If the bridge will not carry a minimum of 2.7 metric tons of live load, the operating rating is **0** metric tons.

NBI Elements > ITEM 66 - Inventory Rating

This capacity rating referred to as the inventory rating, will result in a load level which can safely utilize an existing structure for an indefinite period of time. Coded as '999' for a structure under sufficient fill such that, according to AASHTO design, the live load is insignificant in the structure load capacity.

NBI Elements > ITEMS 67, 68, 69, 71, 72 - Appraisal ratings

- Structural Evaluation
- Deck Geometry
- Underclearances, Vertical and Horizontal
- Water Adequacy
- Approach Roadway Alignment

Code	Description
N	N/A
9	Superior to present desirable criteria
8	Equal to present desirable criteria
7	Better than present minimum criteria
6	Equal to present minimum criteria
5	Somewhat better than minimum adequacy to tolerate being left in place as is
4	Meets minimum tolerable limits to be left in place as is
3	Basically intolerable requiring high priority of corrrective action
2	Basically intolerable requiring high priority of replacement
1	This value of rating code not used
0	Bridge closed
99	Miscoded data

NBI Elements > ITEMS 70 - Bridge Posting

Code	Description
5	Equal to or above legal loads
4	00.1 - 09.9 % below
3	10.0 - 19.9 % below
2	20.0 - 29.9 % below
1	30.0 - 39.9 % below
0	> 39.9% below
99	Miscoded data

NBI Elements > ITEM 75A - Type of Work

Code	Description
31	Replacement of bridge or other structure because of substandard load carrying capacity or substantial bridge roadway geometry.
32	Replacement of bridge or other structure because of relocation of road.
33	Widening of existing bridge or other major structure without deck rehabilitation or replacement; includes culvert lengthening.
34	Widening of existing bridge with deck rehabilitation or replacement.
35	Bridge rehabilitation because of general structure deterioration or inadequate strength.
36	Bridge deck rehabilitation with only incidental widening.
37	Bridge deck replacement with only incidental widening.

38	Other structural work, including hydraulic replacements.
99	Miscoded data

NBI Elements > ITEM 75B - Work Done By

Code	**Description**
1	Work to be done by contract
2	Work to be done by owner's forces
99	Miscoded data

NBI Elements > ITEM 76 - Length of Structure Improvement

This is the length of the proposed bridge improvement measured **in meters**.

NBI Elements > ITEM 90 - Inspection Date

This is the month(2-digits) and year(4-digits) of the last routine inspection of the structure performed.

NBI Elements > ITEM 91 - Designated Inspection Frequency

This is the number of months between designated inspections of the structure.

NBI Elements > ITEMS 92A, 92B, 92C - Critical Feature Inspection

- Fracture Critical Details
- Underwater Inspection
- Other Special Inspection

1st digit

Code	**Description**
Y	Special inspection or emphasis needed
N	Not needed

2nd and 3rd digit
2 - digit number to indicate the number of months between inspections only if the first digit is coded 'Y'.

NBI Elements > ITEMS 93A, 93B, 93C - Critical Feature Inspection Date

If the first digit of Item 92 is coded 'Y' then the first 2 - digits represent the month and last 2 - digits represent
the year that the last inspection of the denoted critical feature was performed.

NBI Elements > ITEM 94 - Bridge Improvement Cost

Estimated cost of the proposed bridge or major structure improvements in thousands of dollars. This cost shall include only bridge construction costs, excluding roadway, right of way, detour, demolition, prelimnary engineering, etc.

NBI Elements > ITEM 95 - Roadway Improvement Cost

Estimated cost of the proposed roadway improvement in thousands of dollars. This shall include only roadway
construction costs, excluding bridge, right-of-way, detour, extensive roadway realignment costs, preliminary
engineering, etc.

NBI Elements > ITEM 96 - Total Project Cost

Estimated total project costs associated with the proposed bridge improvement project in thousands of
dollars, including incidental costs not included in Items 94 and 95. The total project cost will therefore
be greater than the sum of Items 94 and 95.

NBI Elements > ITEM 97 - Year of Improvement Cost Estimate

The 4 - digit year that the costs of work estimated in Items 94, 95 and 96 were based upon.

NBI Elements > ITEM 98 - Border Bridge

This item indicates structures crossing borders of States.

Segment	Description
98A	Neighboring State Code[3 digits]
98B	Percent Responsibility*[2 digits]

* - Percentage of total deck area of the existing bridge that the neighboring State is responsible for funding.

If the structure is not on a border, left blank.

NBI Elements > ITEM 99 - Border Bridge Structure Number

This item indicates neighboring State's 15-Digit NBI structure number for any structure noted in Item 98.
Blank if Item 98 is blank.

NBI Elements > ITEM 100 - STRAHNET Highway Designation

Code	Description
1	The inventory route is not a STRAHNET route.
2	The inventory route is on a Interstate STRAHNET route.
3	The inventory route is on a Non-Interstate STRAHNET route.
4	The inventory route is on a STRAHNET connector route.

99	Miscoded data

NBI Elements > ITEM 101 - Parallel Structure Designation

Code	Description
R	The right structure of parallel bridges carrying the roadway in the direction of the inventory.
	(For a STRAHNET highway, this is west to east and south to north.)
L	The left structure of parallel bridges. This structure carries traffic in the opposite direction.
N	No parallel structure exists.
99	Miscoded data

NBI Elements > ITEM 102 - Direction of Traffic

Code	Description
0	Highway traffic not carried
1	1 - way traffic
2	2 - way traffic
3	One lane bridge for 2 - way traffic
99	Miscoded data

NBI Elements > ITEM 103 - Temporary Structure Designation

Code	Description
T	Temporary structure(s) or conditions exist.
99	Miscoded data

Blank if not applicable.

NBI Elements > ITEM 104 - Highway System of the Inventory Route

Code	Description
0	Inventory Route is not on the NHS.
1	Inventory Route is on the NHS.
99	Miscoded data

NBI Elements > ITEM 105 - Federal Lands Highway

Code	Description
0	N/A
1	Indian Reservation Road (IRR)
2	Forest Highway (FH)
3	Land Management Highway System (LMHS)
4	Both IRR and FH
5	Both IRR and LMHS

6	Both FH and LMHS
9	Combined IRR, FH and LMHS
99	Miscoded data

NBI Elements > ITEM 106 - Year Reconstructed

4 - digit year of most recent reconstruction of the structure. If there has been no reconstruction, year is **0**.

NBI Elements > ITEM 107 - Deck Structure Type

Code	Description
1	Concrete Cast-in-Place
2	Concrete Precast Panels
3	Open Grating
4	Closed Grating
5	Steel plate (includes orthotropic)
6	Corrugated Steel
7	Aluminum
8	Wood or Timber
9	Other
N	Not applicable
99	Miscoded data

NBI Elements > ITEM 108 - Wearing Surface/Protective System

Information on the wearing surface and protective system of the bridge deck is composed of 3 segments.

Length	Segment	Description
1 digit	108A	Type of Wearing Surface
1 digit	108B	Type of Membrane
1 digit	108C	Deck Protection

NBI Elements > ITEM 108A - Type of Wearing Surface

Code	Description
1	Monolithic Concrete (concurrently placed with structural deck)
2	Integral Concrete (separate non-modified layer of concrete added to structural deck)
3	Latex Concrete or similar additive
4	Low slump Concrete
5	Epoxy Overlay
6	Bituminous
7	Wood or Timber
8	Gravel
9	Other
0	None (no additional concrete thickness or wearing surface is included in the bridge deck)
N	Not applicable (applies only to structures with no deck)

99	Miscoded data

NBI Elements > ITEM 108B - Type of Membrane

Code	**Description**
1	Built-up
2	Preformed Fabric
3	Epoxy
8	Unknown
9	Other
0	None
N	Not applicable (applies only to structures with no deck)
99	Miscoded data

NBI Elements > ITEM 108C - Deck Protection

Code	**Description**
1	Epoxy Coated Reinforcing
2	Galvanized Reinforcing
3	Other Coated Reinforcing
4	Cathodic Protected
6	Polymer Impregnated
7	Internally Sealed
8	Unknown
9	Other
0	None
N	Not applicable (applies only to structures with no deck)
99	Miscoded data

NBI Elements > ITEM 109 - Average Daily Truck Traffic

The percentage that shows the percentage of Item 29 - Average Daily Traffic that is truck Trafic.

NBI Elements > ITEM 110 - Designated National Network

Code	**Description**
0	The inventory route is not part of the national network for trucks.
1	The inventory route is part of the national network for trucks.
99	Miscoded data

NBI Elements > ITEM 111 - Pier or Abutment Protection

Code	**Description**
1	Navigation protection not required
2	In place and functioning
3	In place but in a deteriorated condition
4	In place but re-evaluation of design suggested

5	None present but re-evaluation suggested
99	Miscoded data

NBI Elements > ITEM 112 - NBIS Bridge Length

Does this structure meet or exceed the minimum length specified to be designated as a bridge for National Bridge Inspection Standards purposes?

Code	Description
Y	Yes
N	No
99	Miscoded data

NBI Elements > ITEM 113 - Scour Critical Bridges

Code	Description
N	Bridge not over waterway.
U	Bridge with "unknown" foundation that has not been evaluated for scour. Until risk can be determined, a plan of action should be developed and implemented to reduce the risk to users from abridge failure during and immediately after a flood event (see HEC 23).
T	Bridge over "tidal" waters that has not been evaluated for scour, but considered low risk. Bridge will be monitored with regular inspection cycle and with appropriate underwater inspections until an evaluation is performed ("Unknown" foundations in "tidal" waters should be coded U.)
9	Bridge foundations (including piles) on dry land well above flood water elevations.
8	Bridge foundations determined to be stable for the assessed or calculated scour condition. Scour is determined to be above top of footing (Example A) by assessment (i.e., bridge foundations are on rock formations that have been determined to resist scour within the service life of the bridge4), by calculation or by installation of properly designed countermeasures (see HEC 23).
7	Countermeasures have been installed to mitigate an existing problem with scour and to reduce the risk of bridge failure during a flood event. Instructions contained in a plan of action have been implemented to reduce the risk to users from a bridge failure during or immediately after a flood event.
6	Scour calculation/evaluation has not been made. (Use only to describe case where bridge has not yet been evaluated for scour potential.)

5 Bridge foundations determined to be stable for assessed or calculated scour condition.
Scour is determined to be within the limits of footing or piles (Example B) by assessment
(i.e.,bridge foundations are on rock formations that have been determined to resist scour
within the service life of the bridge), by calculations or by installation of properly designed countermeasures (see HEC 23).

4 Bridge foundations determined to be stable for assessed or calculated scour conditions;
field review indicates action is required to protect exposed foundations (see HEC 23).

3 Bridge is scour critical; bridge foundations determined to be unstable for assessed or calculated scour conditions:
- Scour within limits of footing or piles. (Example B)
- Scour below spread-footing base or pile tips. (Example C)

2 Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by:
- a comparison of calculated scour and observed scour during the bridge inspection, or
- an engineering evaluation of the observed scour condition reported by the bridge inspector in Item 60.

1 Bridge is scour critical; field review indicates that failure of piers/abutments is imminent. Bridge is closed to traffic. Failure is imminent based on:
- a comparison of calculated and observed scour during the bridge inspection, or
- an engineering evaluation of the observed scour condition reported by the bridge inspector in Item 60.

0 Bridge is scour critical. Bridge has failed and is closed to traffic.

99 Miscoded data

NBI Elements > ITEM 114 - Future Average Daily Traffic

The forecasted average daily traffic(ADT) for the inventory route identfied in Item 5.

NBI Elements > ITEM 115 - Year of Future Average Daily Traffic

Year represented by the future ADT in Item 114.

NBI Elements > ITEM 116 - Minimum Navigation Vertical Clearance, Vertical Lift Bridge

The minimum vertical clearance imposed at the site as measured above a datum that is specified on a navigation
permit issued by a control agency. Measured **in meters**.

NBI Elements > Deck area

This is Deck width(ITEM 52) times Structure length(ITEM 49) or ITEM_52 x ITEM_49.

NBI Elements > FIPS

The first 2 digits are the Federal Information Processing Standards (FIPS) code for Item 1, and the last 3 digits are the code for Item 3.

NBI Elements > Status

Code	Description
0	Not defecient
1	Structurally defecient
2	Functionally obsolete
N	Not applicable

NBI Elements > Sufficiency rating

The sufficiency is a method of evaluating highway bridge data by calculating four separate factors to obtain a numeric value which is indicative of bridge sufficiency to remain in service. The result of this method is a percentage in which 100 percent would represent a entirely sufficient bridge and zero percent would represent an entirely insufficient or deficient bridge.

NBI Elements > Structurally defecient(SD) & Functionally obsolete(FO) Criteria

Below are the definitions for SD criteria and FO criteria in this application. It must be noted that, based on the criteria used, a bridge could be both structurally deficient and functionally obsolete.

The status field however provides the option of running a query in which a bridge designated as functionally obsolete is not structurally deficient. In other words functionally obsolete bridges are exclusive of structurally deficient bridges.
Also, the status field definition of bridge deficiencies is limited only to those bridges which are 10 years or older and are more than 20 feet in length.

Definition of SD criteria
SD(Structurally deficient) criteria are defined as bridges that meet at least one of the following qualifications:

1. ITEM 58 coded 0, 1, 2, 3 or 4; or
2. ITEM 59 coded 0, 1, 2, 3 or 4; or

3. ITEM 60 coded 0, 1, 2, 3 or 4; or
4. ITEM 62 coded 0, 1, 2, 3 or 4; and the last two digits of ITEM 43 are coded 19; or
5. ITEM 67 coded 0, 1 or 2; or
6. ITEM 71 coded 0, 1 or 2 and the last digit of ITEM 42 coded 0, 5, 6, 7, 8 or 9.

Definition of FO criteria
FO(Functionally Obsolete) criteria are defined as bridges that meet at least one of the following qualifications:

1. ITEM 68 coded 0, 1, 2 or 3; or
2. ITEM 69 coded 0, 1, 2 or 3 and the last digit of ITEM 42 coded 0, 1, 2, 4, 6, 7 or 8; or
3. ITEM 72 coded 0, 1, 2 or 3; or
4. ITEM 67 coded 3; or
5. ITEM 71 coded 3 and the last digit of ITEM 42 coded 0, 5, 6, 7, 8 or 9.