APPENDIX A

NCE Final Report - March 2019

Final Report

Evaluation of Pavement Management Program

March 28, 2019

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City of Spokane Valley

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FINAL REPORT

EVALUATION OF PAVEMENT MANAGEMENT PROGRAM

Prepared for:

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EXECUTIVE SUMMARY

The City of Spokane Valley (City) has contracted with Infrastructure Management Systems (IMS) from 2010 to present to provide pavement management services, which include a pavement management software application and pavement condition surveys on approximately a 2-year cycle. To date, IMS has conducted automated pavement condition surveys of the City's street network in 2010, 2013, 2015, and 2017. The IMS Easy Street Excel spreadsheet (Easy Street) is used to analyze pavement condition data, identify and prioritize rehabilitation projects, and estimate budget needs.

The objective of this project was to evaluate and assess the City's pavement management process and, if needed, to provide recommended enhancements. The project objectives were accomplished based on the following tasks:

- **Task 1. Kick-Off Meeting**: discuss administrative and project details.
- **Task 2. Records Review**: review agency documentation related to pavement management.
- **Task 3. Review Function of Easy Street Analysis**: review Easy Street parameters and outputs, and assess possible deficiencies.
- **Task 4. Define Network Targets**: determine if the City's network pavement condition targets are reasonable and achievable under the current funding source; determine local agency target values and compare with the City targets.
- **Task 5. Recommended Maintenance and Rehabilitation Strategies**: review current maintenance and rehabilitation strategies, recommended appropriate treatments and timing, and update treatment costs as needed.
- **Task 6. Conduct Budget Analysis**: evaluate the City's current budget needs analysis and recommend revisions or additional budget scenarios.
- **Task 7. Recommended Tools and Training**: provide recommendations on pavement management training needs and software tools.
- **Task 8. Provide Suggestions for Public Outreach**: provide public outreach recommendations to the City.
- **Task 9. Identify Implementation Requirements**: evaluate and identify implementation activities requiring refinement or needs to be addressed.
- **Task 10. Prepare a Final Report**: document the efforts, findings, and recommendations of this project.
- **Task 11. Conduct Quality Control of Pavement Condition Survey**: Conduct a pavement condition survey on a 5 percent sample of the City's pavement network and compare with the results of the IMS pavement condition survey.

In general, the City's current procedures meet the primary components (and processes) of a pavement management system. Based on the results of this study, the following provides a list of key recommendations:

Pavement Condition Survey

- Increase the frequency of the pavement condition survey.
- Develop and implement a data quality management plan.
- Continue to utilize automated pavement condition survey methods.

Easy Street

- Confirm the accuracy of the performance prediction models.
- Obtain user manual.
- Address functionality issues.
- Request the addition of detailed pavement condition survey results and City-provided work activities.

Maintenance and Rehabilitation Strategies

- Increase treatment costs to reflect recent contract bid awards and inclusive costs.
- Consider incorporating pavement preservation into the City's work activities.

Budget Analysis

- Consider dedicating a portion of the annual budget to preventive maintenance.
- Pursue additional funding sources to ensure target-driven scenarios are feasible.
- Consider increasing overall pavement condition target to a PCI greater than 70.

Tools and Training

- Develop a "desk manual" that documents the City's pavement management process.
- Assess report recommendations and consider need to evaluate other pavement management programs.

Public Outreach

- Develop a public outreach program/schedule that promotes and develops the City's pavement management program.

BACKGROUND

Over the last 8 years, the City of Spokane Valley (City) has contracted with Infrastructure Management Systems (IMS) to provide pavement management services. During this time period, IMS has conducted automated pavement condition surveys of the City's street network in 2010, 2013, 2015, and 2017. The IMS Easy Street Excel spreadsheet (Easy Street) is used to analyze pavement condition data, identify and prioritize rehabilitation projects, and estimate budget needs.

OBJECTIVE

The objective of this project is to evaluate and assess the City's pavement management process and, if needed, to provide recommended enhancements. To successfully meet this objective, this project included:

Task 1. Kick-Off Meeting: discuss administrative issues, invoicing, points of contact, scope of work, budget, and schedule, obtaining applicable documents (e.g., IMS files, recent construction bid tabs), etc.

Task 2. Records Review: review agency procedures, timelines, reports, and past budgets to assess the efficiency, methodology, and frequency of the pavement condition surveys.

Task 3. Review Function of Easy Street Analysis: review Easy Street parameters and outputs, and assess possible deficiencies.

Task 4. Define Network Targets: determine if the City's network pavement condition targets are reasonable and achievable under the current funding source; develop an online survey for dissemination to local agencies in the Pacific Northwest to determine local agency target values and compare with the City targets.

Task 5. Recommended Maintenance and Rehabilitation Strategies: review current maintenance and rehabilitation strategies, recommended appropriate treatments and timing, and update treatment costs as needed.

Task 6. Conduct Budget Analysis: evaluate the City's current budget needs analysis and recommend revisions or additional budget scenarios.

Task 7. Recommended Tools and Training: provide recommendations on software tools to improve the current pavement management program; improve efficient use of the pavement management program, or support implementing a different pavement management program software, and recommend City staff training needs.

Task 8. Provide Suggestions for Public Outreach: provide public outreach recommendations to the City.

Task 9. Identify Implementation Requirements: evaluate and identify implementation activities requiring refinement or needs to be addressed.

Task 10. Prepare a Final Report: document the efforts, findings, and recommendations of this project. This task constitutes the compilation of all the various task memos and does not have specific sections within this report (i.e. summary, findings, recommendations, etc.)

Task 11. Conduct Quality Control of Pavement Condition Survey: Conduct a 5 percent sample of the City's pavement network and compare with the results of the IMS pavement condition survey.

TASK 1. KICK-OFF MEETING

The project kick-off meeting was held on June 21, 2018 and attended by the City of Spokane Valley (City) staff (Bill Helbig, John Hohman, and Adam Jackson) and NCE (Linda Pierce). During this meeting, project details, contacts, and expectations were discussed.

Pavement Network and Condition

The City is responsible for the maintenance and rehabilitation of approximately 448.7 miles of pavement, or 4,861 pavement sections (defined by functional class, length, width, etc.). Table 1 summarizes the pavement network by functional class. The majority of the City's pavement network is composed of local roads, with minor arterials composing the second largest portion of the pavement network. In addition, the City's pavement network consists of approximately 99.5 percent of asphalt pavements and 0.5 percent of jointed plain concrete pavements.

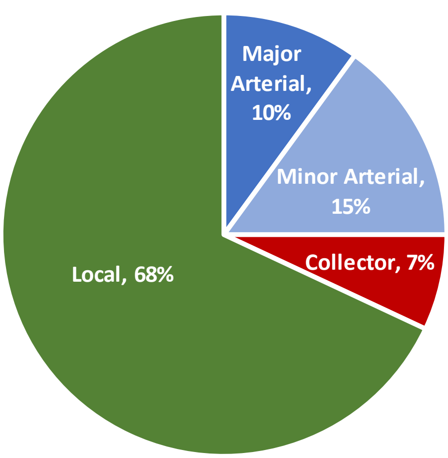
Table 1. Summary Statistics for Pavement Network

Functional Class	No. of Sections	Length (mi)	% Pavement Type	
			Asphalt	Concrete
Major Arterial	240	28.0	5.88	0.37
Minor Arterial	665	62.6	13.78	0.16
Collector	332	34.1	7.61	0.00
Local	3,624	324.0	77.20	0.00
Total	4,861	448.7	99.47	0.53

Note: based on Easy Street.

The pavement condition index (PCI) is a measure of pavement condition and ranges from zero to 100. The PCI calculation is based on ASTM D6433, *Standard Practice for Roads and Parking Lots Condition Index Surveys.* A newly constructed street will have a PCI of 100, while a failed street will have a PCI of 25 or less.

The City pavement network currently has an average PCI of 69 with a backlog (total dollar amount for pavement treatments that are needed but cannot be performed due to lack of funding) of 7.3 percent (Figure 1). Major arterials and local roads have PCIs greater than the network average, while minor arterials and collectors have PCIs lower than the network average.



Functional Class	Area (yd^2)	PCI[a]	Backlog[a]
Major Arterial	993,200	71	1.2
Minor Arterial	1,465,800	67	0.5
Collector	669,700	68	0.4
Local	6,473,400	70	5.1
Network	**9,602,100**	**69**	**7.3**

[a] Values taken from IMS's 2017 survey data and aged to January 1, 2019 using Easy Street.

Figure 1. Network area breakdown by functional class.

Figure 2 illustrates the PCI categories utilized by the City. Pavement condition categories (e.g., good, fair, poor) are set by each agency and are entirely dependent on an agency's interpretation of an acceptable levels of service. Since the City's current condition categories are consistent with industry standards and aligns with condition scales implemented by other agencies, NCE does not recommend any modifications at this time.

Condition	PCI
Excellent	100
Very Good	85
Good	70
Fair	60
Poor	40
Very Poor	25 0

PCI Examples

Figure 2. Pavement condition categories.

TASK 2. RECORDS REVIEW

To get a better assessment of the City's pavement management process, NCE reviewed agency procedures, timelines, reports, and past budgets to assess the efficiency, methodology, and frequency of the pavement condition surveys. Information reviewed included:

- *Pavement Management in Spokane Valley* – Microsoft PowerPoint presentation.
- 2018 Annual Budget.
- 2019-2024 *Six Year Transportation Improvement Program* (TIP).
- IMS Pavement Analysis Maps (functional class, PCI, condition rating (descriptive good-fair-poor), projects, and rehabilitation plan and 5-year post rehabilitation PCI based on a $3.2M annual budget.
- IMS Survey Review Map.
- IMS *Pavement Management Analysis Report* (January 2014).
- IMS *Pavement Management Analysis Report* (March 2018), excludes maps – PDF.
- IMS *Pavement Management Analysis Report* (April 2018) – Hardcopy.
- IMS SV_2017_ESA_Rev3_Baseline_Analysis Microsoft Excel spreadsheet.
- Links to Standard Plans and Public Works Projects.
- IMS website.
- 5-year Project Plan Map: 2014-2018 ($2M rehabilitation plan) and 2014-2018 ($7.25M rehabilitation plan).
- GeoEngineers, *Falling Weight Deflectometer Testing, Pavement Coring and Overlay Feasibility Evaluation* (December 28, 2015) – provided for information only.
- 2018 FWD & Coring Locations – provided for information only.
- Project bid tabulations:
    - 0141, Sullivan/Euclid PCC Intersection.
    - 0142, Broadway Argonne Mullan Intersection.
    - 0240, Saltese Road Reconstruction.
    - 0248, Sprague – Sullivan to Corbin.
    - 0251, Euclid Avenue Reconstruction.
    - 0253, Mission Street Preservation (Pines Rd to McDonald Rd).
    - 0254, Mission Street Preservation – McDonald to Evergreen.
    - 0255, Indiana Street Preservation.
    - 0272, Euclid Avenue Pavement Preservation.

Findings

Based on the reviewed documents, NCE noted the following:

- Pavement condition surveys were conducted in 2010, 2013, 2015, and 2017. Each pavement condition survey included data collection on approximately half of the arterial and collector roadway network, and approximately one-third of the local road network.
- Automated condition surveys were conducted in accordance with ASTM D6433 and include assessment of surface rutting (asphalt-surfaced pavements only) and pavement roughness as determined by the International Roughness Index (IRI).
- Pavement condition survey results were analyzed using both automated and semi-automated methods. IRI, wheel path rutting, transverse cracking, block cracking, alligator cracking, and

texture were collected and analyzed using sensors mounted on the collection vehicle and computer algorithms (based on information obtained from IMS website). All other surface distresses were identified by visually reviewing pavement images and noting distress type, severity, and extent.

- Provided documentation did not include a description of data collection quality control or acceptance requirements.
- Preservation treatments are not included in the City's work activities.

Discussion

The frequency and extent of data collection cycle is slightly lower than ideal (i.e., longer time span between data collection cycles). A 100 percent survey of arterials and collectors is completed every 4 years and completed every 6 years for local roads. In addition, while assessing surface distress using semi-automated methods is the current state-of-the-practice, there is an increasing trend in the use of 3-dimensional data collection systems, which are capable of automatically collecting and assessing surface distress with no (or limited) human interaction. An example automated image of the pavement surface, along with colored lines indicating pavement distresses, is shown in Figure 3.

a. Driver perspective. b. Surface image. c. Identified distress.

Figure 3. Example 3D image (courtesy of New Mexico DOT).

The ability to accurately optimize pavement preservation and rehabilitation timing and treatment is dependent on sufficient data to capture the condition of the existing pavement, predict future performance, and balance with available funding. Ideally, conducting data collection on the entire pavement network every 1 to 2 years will greatly improve the ability to determine future pavement needs; however, doing so results in increased costs for data collection and analysis.

Table 2 summarizes the current frequency along with two recommended options for future pavement condition surveys. Option 1 includes conducting the pavement condition survey on the entire arterial and collector network (100 percent survey every 2 years) and half of the local road network (100 percent survey every 4 years). Option 2 includes conducting the pavement condition survey on all arterials (100 percent survey every 2 years), 50 percent for collectors (100 percent survey every 4 years), and 33 percent for local roads (100 percent survey every 6 years).

Table 2. Extent of Data Collection (every 2 years)

Functional Class	Total Miles	Current		Option 1		Option 2	
		% Network	Miles[1]	% Network	Miles	% Network	Miles
Major Arterial	28.0	50	14.0	100	28.0	100	28.0
Minor Arterial	62.6	50	31.3	100	62.6	100	62.6
Collector	34.1	50	17.1	100	34.1	50	17.1
Local	324.0	33	108.0	50	162.0	33	108.0
Total	448.7	—	170.4	—	286.7	—	215.7

[1] Miles by functional class based on the *Pavement Management Analysis Report* (April 2018). However, report indicates a total of 230 survey miles, which does not match the total current miles shown.

The inclusion and cost impact of preservation treatments is illustrated in Figure 4. History has shown that it costs much less to maintain pavements in good condition than to repair pavements that have failed. By allowing pavements to deteriorate, streets that once cost $4.70/yd^2 to chip seal may soon cost $31.50/yd^2 to overlay or $100/yd^2 for reconstruction. In other words, significant delays in pavement repair can result in significantly higher costs to do more extensive repair (over 24 times more).

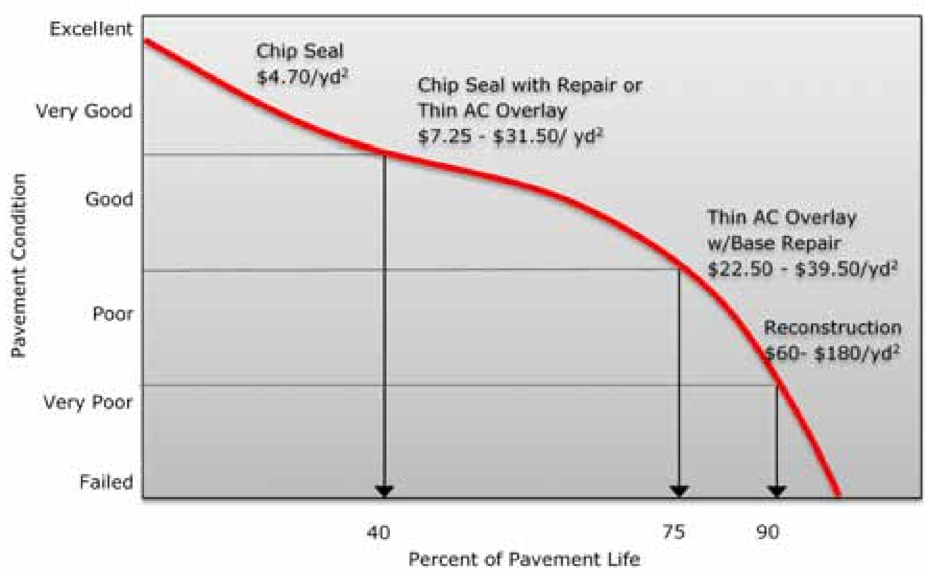


Figure 4. Costs of maintaining pavements over time.

Recommendations

Based on the assessment of the City's documents, it is recommended (and discussed in more detail later in the report) the City:

- Increase the frequency of the pavement condition survey to:
  - Arterial and collector network (100 percent survey every 2 years) and half of the local road network (100 percent survey every 4 years) or
  - All arterials (100 percent survey every 2 years), 50 percent for collectors (100 percent survey every 4 years), and 33 percent for local roads (100 percent survey every 6 years).

- Confirm the accuracy of the Easy Street performance prediction models. If provided by IMS, the existing pavement condition survey results can be used to modify the pavement performance prediction models.
- Develop a data quality management plan that includes, at a minimum, data quality control procedures (vendor) and acceptance (agency) criteria.
- Continue to utilize automated pavement condition survey methods.
- Consider incorporating pavement preservation into the City's work activities.

TASK 3. EASY STREET FUNCTIONALITY

A review of Easy Street, its parameters, and outputs was conducted to determine efficiency, current data quality, and any possible deficiencies. The evaluation was intended to assist the City in understanding the compatibility for coordinating Easy Street with the current Maintenance and potential Asset Management Programs.

Parameters

The following provides a summary and description of the Easy Street parameters reviewed by NCE. For each parameter, the tab names and cell or column locations are also provided.

- **Backlog** (Network Analysis [NA] tab, cell IT7). Percent of total area representing projects with a PCI of 40 or less.
- **Annual expenditure for current year** (NA tab, cell IO7). Cost to address current backlog. This is a reported value based on the selected budget analysis; the expenditure is not spent.
- **Surface Distress Index (SDI)** (NA tab column AE). This is calculated as 100 minus the sum of the distress deducts. If the sum of the distress deducts is greater than 100, then SDI is set to 0. Rutting is only applied to asphalt pavements.
- **Roughness Index (RI)** (NA tab, column AF). Index ranging from 0 to 100 representing the riding comfort or smoothness of the pavement. Pavement smoothness is measured in accordance with International Roughness Index (IRI). IRI is converted to RI using:

  $$RI = [11.0 – 3.5 \times \ln (IRI)] \times 10$$

  RI from 0 to 50 represents a rough pavement, 50 to 75 is a normal/aged pavement, and 75 to 100 is a smooth pavement.
- **Structural Index (SI)** (NA tab, column AG).
  - If deflection testing was performed, SI = deflection results (NA tab column U). This is a user developed score ranging from 0 to 100.
  - If deflection testing was not performed, SI = default values representing weak, moderate, or strong pavement. These values depend on the pavement type, the PCI, and the load associated distress deduct. SI is selected based on a strength code (SC) where:
    - SC = 1 corresponds to an SI of 30 (PCI ≥ 80).
    - SC = 2 corresponds to an SI of 60 (load associated distress deduct > 95 – PCI) and for all concrete pavements.
    - SC = 3 corresponds to and SI of 80 (load associated distress deduct < 75 – PCI).
- **Pavement Condition Index (PCI)** (NA tab, column AH).
  - If deflection testing was performed:

    $$PCI = 0.5*SDI + 0.25*RI + 0.25*SI$$
  - If no deflection testing was performed:

$$PCI = 0.67*SDI + 0.33*RI$$

Roughness is used as a factor when determining PCI regardless of pavement type (asphalt, concrete, or composite). Coefficients shown in the above equations can be modified by the user in the Parameters tab (cells C28:D30). The calculation of PCI is not in accordance with ASTM D6433, rather the PCI calculation represents a composite index due to the inclusion of RI. It appears that there is a circular reference between SI and PCI if deflection testing is performed. Currently the City does not include deflection testing in the pavement management process so this circular reference does not affect the PCI calculations. However, if deflection testing is included in the future, this circular reference should be further investigated and addressed.

- **Rehab Activity Code (RAC)** (NA tab, column DV). Selected from the Parameters tab based on pavement type and PCI. Potential rehabilitation activities, codes, and associated costs are listed in Rehab Activities (RA) tab. The cost associated with routine maintenance (RA tab, row 12) is zero. Many of the unit costs associated with various rehabilitations are low and should be revised.
- **Strength Priority Factor (StPF)** (NA tab, column ED). 100, 60, or 20 representing weak, moderate, or strong pavement, respectively. StPF depends on SC:
  - For SC = 1, StPF = 100.
  - For SC = 2; StPF = 60.
  - For SC = 3; StPF = 20.
- **Pavetype Priority Factor** (NA tab, column EE). 100, 75, or 95 for asphalt, concrete, or composite pavement, respectively.
- **Functional Class Priority Factor** (NA tab, column EF). 100, 80, 60, or 40 for major arterial, minor arterial, collector, or local roads, respectively.
- **Area Priority Factor** (NA tab, column EG). Project area in square yards divided by 100.
- **Need Year Priority Factor** (NA tab, column EK).
  - If a dedicated project, Need Year Priority Factor = 1000.
  - If not a dedicated project, Need Year Priority Factor = 75 and 100 for non-critical or critical projects, respectively. A project becomes critical a few PCI before it deteriorates to the next lowest condition category.
- **Sequence Priority Factor (SePF)** (NA tab, column EL). Value selected from Parameters tab ranging from 20 to 160 depending on strength, pavement type, and PCI. The SePF is selected from a series of tables. First a rehab code (RC) is assigned to each project based on PCI (Parameters tab, cells J58:K68).

Table 3. Rehabilitation Codes and Corresponding PCI Values

RC	1	2	3	4	5	6	7	8
PCI	0	25	40	50	60	70	80	85

Using the RC and SC, the SePF is determined (Parameters tab B161:K164) for each pavement type (Table 4).

Table 4. Sequence Priority Factor Based on Rehab and Strength Code

SC	RC								Pavetype
	1	2	3	4	5	6	7	8	
1	60	90	120	50	50	90	50	50	ACP/CMP
2	80	140	140	70	70	110	70	70	ACP/CMP
3	100	160	100	100	130	130	90	90	ACP/CMP
PCC	80	60	60	20	20	20	20	55	PCC

Note: ACP – asphalt concrete pavement; CMP – composite pavement; PCC – concrete pavement.

- **Priority Value** (NA tab, column EM). The Priority Value is calculated as:

$$\left[\frac{(50 * Seq.\ PF + 25 * Str.\ PF + 10 * Pavetype\ PF + 25 * FunC.\ PF + 50 * (100 - PCI) + 1 * Area\ PF)}{(50 + 25 + 10 + 25 + 50 + 1)}\right] * \left(\frac{Need\ Yr\ PF}{100}\right)$$

  The higher the priority value the more urgent the project. The priority value is based on sequence (which is based on strength and PCI), as well as strength and PCI thus accounting for these factors twice.

- **Priority Rank** (NA tab, column EN). Assigns a project ranking order based on the priority value. Higher priority values receive lower priority ranks. Multiple projects can have the same priority rank value. If they do, the projects are combined into the same project on the hidden Ranking Calcs tab.

  Combining projects with the same ranking may result in a high project cost (depending on the number of combined sections and recommended treatment). If the combined project cost is greater than the estimated budget (or remaining budget for a given year), the project will not be selected. In a constrained budget scenario (i.e., annual pavement rehabilitation needs exceed available annual budget), this function may result in some projects never being selected for rehabilitation.

  Additional analysis was conducted to determine how large of an impact this may be for identifying projects for rehabilitation. The hidden Ranking Calcs tab was reviewed and the number of pavement sections with the same ranking was determined. Of the 4,909 pavement sections the:

  - Number of sections with the same rank as another section: 3,944 (or 80 percent).
  - Number of sections with the same rank, but sections are on different streets: 111.
  - Maximum number of sections with the same rank: 13.
  - Number of priority ranks with only one pavement section: 10.

  The project ranking process may have a significant impact on the network's segment prioritization process; however, as a minimum this introduces potential additional inaccuracies to the segment prioritization process.

Review of NETWORK ANALYSIS Commands

In order to obtain a better understanding of the analysis conducted in Easy Street, the following commands within the NA tab were reviewed and are described below:

- **Update PCI**. Changes Current PCI Date (cell IM3) to today's date and updates the current PCI for each segment in the inventory.

- **Restore PCI**. Changes Current PCI Date (cell IM3) to date in Restore PCI to Previous Date cell (cell IU4) and updates the current PCI for each segment in the inventory.
- **Run 10X Profile**.
  - Zeros out year 1 budget.
  - Increases year 1 budget in increments (determined by estimated steady state budget AR tab, cells O81:P91).
  - Updates 10 profiles on AR tab.
  - This analysis allows for the calculation of the steady state, control PCI, target PCI, maintain existing backlog, control backlog, and target backlog budgets (AR tab, rows 231 and 249).
- **Run Control**.
  - Enters year 1 budget as $99M and determines expenditure to fix all pavement sections and copies and pastes the updated agency budget as the Fix All Budget scenario in AR tab.
  - Enters average value of Fix All (AR tab, cell N111) as year 1 budget and copies and pastes, the updated agency budget as the Fix All Budget Averaged scenario in AR tab.
  - Enters steady state budget (AR tab, cell H231) as year 1 budget and copies and pastes the updated agency budget as the Steady State Current PCI Budget scenario in AR tab.
  - Enters maintain exist backlog budget (AR tab, cell H249) as year 1 budget and copies and pastes the updated agency budget as the Maintain Current Backlog Budget scenario in AR tab.
  - Enters PCI control budget (AR tab, cell J231) as year 1 budget and copies and pastes the updated agency budget as the PCI Control Budget scenario in AR tab.
  - Enters control backlog budget (AR tab, cell J249) as year 1 budget and copies and pastes the updated agency budget as the Backlog Control Budget scenario in AR tab.
  - Enters target PCI budget (AR tab, cell M231) as year 1 budget and copies and pastes the updated agency budget as the Target PCI =72 Budget scenario in AR tab.
  - Enters target backlog budget (AR tab, cell M249) as year 1 budget and copies and pastes the updated agency budget as the Target Backlog = 10% Budget scenario in AR tab.
  - Enters recommended budget (AR tab, cell N135) as year 1 budget and copies and pastes the updated agency budget as the recommended budget scenario in AR tab.
- **Create Inventory**. Updates Inventory tab from inventory listed on NA tab.
- **Rehab Plan by Segment**. Updates Rehab by Segment tab based on the budget currently displayed on the NA tab.
- **Rehab Plan by Year**. Updates Rehab by Year tab based on the budget currently displayed on the NA tab.
- **Need Year Analysis**.
  - Removes committed projects from schedule.
  - Makes year 1-5 (NA tab, cells IK8:12) budget value = 1 to call out Need Year annual values (assumes unlimited funds and no committed projects and optimizes treatments and costs for the next 5 years).
  - Copies Need Year annual values (Analysis Results [AR] tab, cells M211:215) to year 1-5 budgets.

  - Copies and pastes updated agency budget to the Need Year Analysis Budget scenario in AR tab.
  - Updates Need Year Rehab tab.
  - Re-enters recommended budget (AR tab, cell N135) in year 1 budget.
- **Agency Budget**. Copies and pastes the currently displayed budget into AR tab. The actual agency budget should be entered into years 1-5 before running. If years 2-5 are updated independent of year 1, the cell links will be overridden.
- **Recommended Budget**. Overrides recommended budget by copying and pasting the currently displayed budget into the AR tab. The override budget is entered into years 1-5 before running.
- **Override Control Runs**. Overrides the calculated budget options by copying and pasting the currently displayed budget into the AR tab. The respective override budget is entered into years 1-5 before running.
- **Order of operation**. The following summarizes the sequence of commands for conducting an analysis:
  1. Update PCI.
  2. Run 10X Profile.
  3. Run Control.
  4. Enter Agency Budget (and any override commands as desired).
  5. Create Inventory.
  6. Rehab Plan by Seg.
  7. Rehab Plan by Year.
  8. Need Year Analysis.

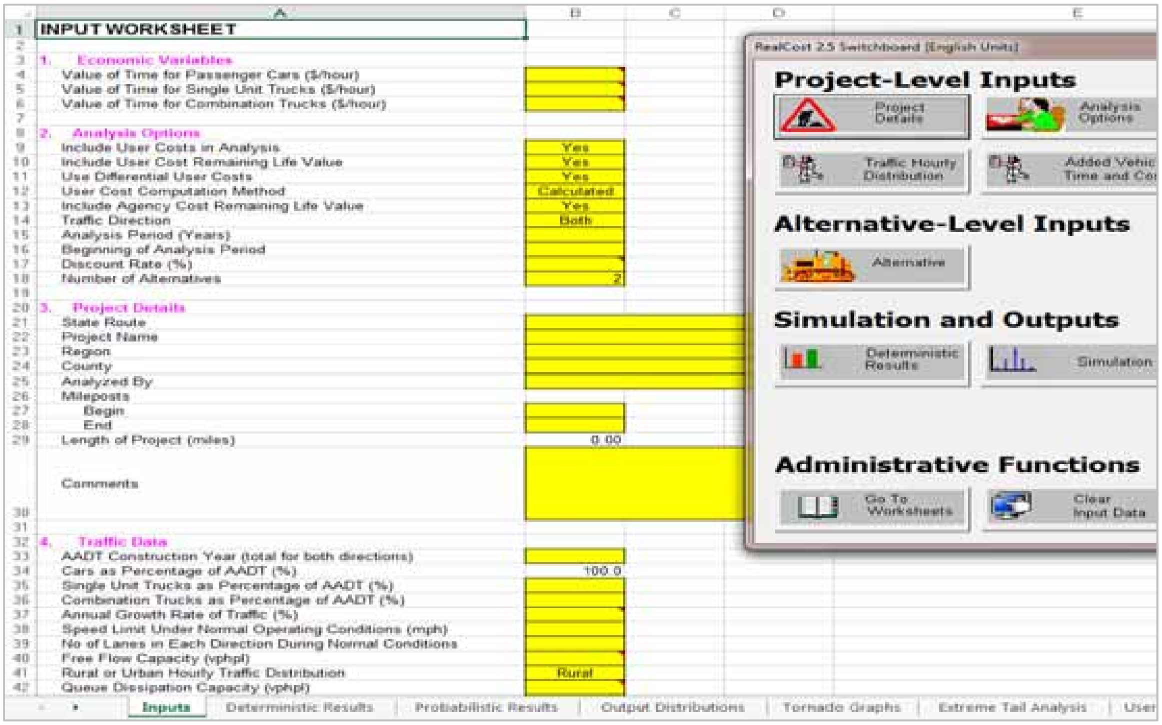
If NA commands are run out of order there is a myriad of errors that can propagate, primarily with respect to the Need Year Analysis command. If the commands are run out of order, cells may not update properly resulting in inaccurate calculations. Sometimes, it's clear when an error occurs because "#N/A" occurs in numerous cells. Other times, it may not be as noticeable that errors have propagated. One way to determine whether or not an error has occurred is to review the Annual PCI tab, if it makes sense and starts at the current PCI value for the network, then the NA commands were likely run in the correct order. Notification of the error may also be noted (albeit "buried") in the Analysis Results tab.

Recommendations

The following are recommended actions to address potential issues and errors in the Easy Street analysis:

- Obtain guidelines (user manual) to indicate the recommended order of NA commands and notes briefly describing each command.
- Consider removing RI from the PCI calculations to be in accordance with ASTM D6433 or revise to indicate that the PCI is a combined index. RI can be used as a separate "trigger" value in the event the City would like to consider pavement roughness in the project selection process.
- Assess and revise the PCI and Priority Factor (PF) calculations to remove circular or double referencing.
- Revise the priority ranking method to allow projects of the same priority/rank to be selected separately in a given budget year.
- Pavement management process are complex. A "front-end" macro application would provide a much improved user interface for navigating through Easy Street. An example application that

uses a "front-end" macro is shown in Figure 5. The macro provides a logical sequence of events, while still providing the user access to the individual worksheets.



Source: https://www.fhwa.dot.gov/infrastructure/asstmgmt/lccasoft.cfm

Figure 5. Example of a macro-driven spreadsheet application.

TASK 4. DEFINE NETWORK TARGETS

Establishing effective and realistic network pavement condition targets is a critical activity for successful implementation and use of a pavement management program. Pavement condition targets must balance, for example, the City's pavement maintenance and rehabilitation budget, the amount of time needed to successfully achieve the targets, the long-term network condition, the resulting backlog, and the traveling public's concern over roadway condition (specifically, ride).

Agency Survey

An online survey was developed to determine local agency pavement condition targets. This was done to assist the City in evaluating current pavement condition targets. The survey was sent to several cities and counties in Idaho, Oregon, and Washington State. In total, 9 agencies responded to the survey: 7 agencies in Oregon, and 2 agencies in Washington State (Table 5). The survey questions and results are summarized below (where applicable, the information for the City has been included to the agency responses):

Table 5. Respondent Contact Information

Name	Agency	Phone Number	E-mail Address
Deborah Martisak	City of Beaverton	971-246-0262	dmartisak@beavertonoregon.gov
Brad Albert	City of Hillsboro	503-681-6234	brad.albert@hillsboro-oregon.gov
Crystal Shum	City of Lake Oswego	503-697-7420	cshum@ci.oswego.or.us
Todd Lites	City of Portland	503-823-6992	todd.liles@portlandoregon.gov
Scott Smith	City of Prineville	541-419-3165	ssmith@cityofprineville.com
Tricia Thompson	City of Redmond	425-556-2776	tthomson@redmond.gov
Mike McCarthy	City of Tigard	503-718-2462	mikem@tigard-or.gov
Monte Puymon	City of Walla Walla	509-524-4513	mpuymon@wallawalla.gov
Brett Sonntag	Pierce County	253-798-6297	brett.sonntag@peircecountywa.gov

What is the method used for assessing pavement condition?

Five of the responding agencies use ASTM D6433, two agencies use the Northwest Pavement Management Association (NWPMA) *Pavement Surface Condition Field Rating Manual for Asphalt Pavements*, one agency uses the San Francisco Bay Area Metropolitan Transportation Commission (MTC) *Pavement Condition Index Distress Identification Manual* (which is based on ASTM D6433), and the City of Walla Walla has currently not identified a pavement condition rating method (Table 6).

Table 6. Method for Assessing Pavement Condition

Agency	Method for Assessing Pavement Condition
City of Spokane Valley	ASTM D6433
City of Beaverton	ASTM D6433
City of Hillsboro	MTC
City of Lake Oswego	ASTM D6433
City of Portland	ASTM D6433
City of Prineville	ASTM D6433
City of Redmond	NWPMA
City of Tigard	ASTM D6433
City of Walla Walla	To be determined
Pierce County	NWPMA

What are your pavement condition TARGETS?

The majority of the cities and counties **target** an overall network PCI range of 70 to 85, which would maintain their network in the "very good" condition category (Table 7). Pierce County and the City of Portland define their pavement condition targets by the percent of each functional class in specified condition categories. The City of Walla Walla has not yet defined pavement condition targets.

Table 7. Pavement Condition Targets by Functional Class

Agency	Pavement Condition Targets				
	Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local
City of Spokane Valley	70	70	70	70	65-70
City of Beaverton	76	76	75	75	73
City of Hillsboro	70	70	70	70	70
City of Portland	80% fair or better	80% fair or better	80% fair or better	80% fair or better	70% fair or better
City of Prineville	85	85	85	85	85
City of Redmond	75	75	75	75	75
City of Tigard	N/A	85	82	80	80
Pierce County	95% good and fair; 5% poor				
Range	70 – 85	70 – 85	70 – 85	70 – 85	70 – 85
Average	77	77	77	77	78

As a follow-up question, agencies were asked if they are able to meet the pavement condition targets listed in Table 7. Of the nine responding agencies, four agencies responded and indicated that the current agency budget level is insufficient to meet pavement condition targets (i.e., pavement needs are greater than agency budget).

What are the number of lane miles for each functional class and overall network?

The two largest overall networks, by a large margin, are the City of Portland and Pierce County, while the City of Redmond has the smallest network (Table 8). The functional class covering the largest number of lane miles is local access or residential roads.

Table 8. Number of Lane Miles by Functional Class

Agency	Number of Lane Miles					
	Major Arterial	Minor Arterial	Major Collector	Minor Collector	Local	Overall Network
City of Spokane Valley	28	63	34	—	324	449
City of Beaverton	—[a]	—	—	—	—	213
City of Hillsboro	18	—	137	—	342	496
City of Lake Oswego	12	—	40	—	131	183
City of Portland	215	479	—	74	2,992	4,849
City of Prineville	—	—	—	—	—	135
City of Redmond	—	—	—	—	—	151
City of Tigard	—	—	—	—	—	350
City of Walla Walla	35	95	39	—	267	436
Pierce County	197	549	592	140	1,702	3,180

(a) Indicates no response.

Previous Agency Surveys

Table 9 summarizes the findings of a previous local agency survey (2012 Municipal Research and Services Center, *Pavement Preservation/Maintenance Program Survey – Washington)*. Agencies reported pavement condition targets of 70 to 85 for arterial routes, 65 to 85 for collector routes, 65 to 85 for local or residential roads, and 50 to 85 for the overall network.

From the survey results, the majority of agency PCI targets range from 70 to 85 regardless of functional class. Many of the responding agencies target a slightly higher PCI for arterials than for collectors and locals/residential. The City PCI target values are within the typical range of other agencies; albeit on the lower end of the range.

Assessment of City Target Values

Table 10 provides a summary of the City's current PCI targets and average PCI results from the 2013 and 2017 pavement condition surveys. From 2013 to 2017, the City was able to improve the condition of arterial roadways to meet the identified target values, while maintaining the condition of the remaining network within the PCI target range (slightly improving the local/residential network).

Recommendations

At this time, it is recommended that the City maintain its current pavement condition target values. However, as will be discussed in Task 6 Budget Analysis, the City's current budget level falls short of meeting the current target values. If a budget increase can be secured, it is recommended that the City update the overall network target to a PCI greater than 70.

Table 9. PCI Targets by Functional Class

Agency	Arterials	Collectors	Local	Overall Network
City of Bellingham, WA	—[a]	—	—	80
City of Bonney-Lake, WA	—	—	—	80
City of Bothell, WA	—	—	—	80
City of Federal Way, WA	—	—	—	78
City of Gresham, OR	—	—	—	75
City of Kirkland, WA	70	65	65	—
City of Marysville, WA	—	—	—	70
City of Medina, WA	—	—	—	60
City of Mukilteo, WA	—	—	—	70
City of Olympia, WA	—	—	—	100% fair or better
City of Renton, WA	—	—	—	80
City of Richland, WA	—	—	—	70
City of Sequim, WA	—	—	—	80
City of Troutdale, OR	—	—	—	70
City of Tualatin, OR	—	—	—	85
City of University Place, WA	—	—	—	70
City of Vancouver, WA	75	75	70	—
City of Yakima, WA	—	—	—	50
Clark County, WA	80	80	80	80
Franklin County, WA	80	80	80	—
Kitsap County, WA	—	—	—	60
Marion County, OR	—	—	—	80
Snohomish County, WA	—	—	—	80
Spokane County, WA	70	70	70	70
Thurston County, WA	—	—	—	70
Washington County, OR	75	75	65	—
Minimum	70	65	65	50
Maximum	80	80	80	80
Average	75	74	72	73

(a) Indicates no response.

Table 10. Meeting Pavement Condition Targets

Year	Pavement Condition Index[a]				
	Major Arterial	Minor Arterial	Collector	Local	Overall
Target	70	70	70	70	70
2017[b]	71	73	70	71	71
Current[c]	71	67	68	70	69

(a) PCI is defined as = 33% x International Roughness Index + 67% Surface Distress Index.

(b) IMS *Pavement Management Analysis Report* (April 2018).

(c) Values taken from IMS's 2017 survey data and aged to January 1, 2019 using Easy Street.

TASK 5. MAINTENANCE AND REHABILITATION STRATEGIES

A review was conducted on the City's maintenance and rehabilitation strategies to determine both treatment type, timing, and costs, and to assess if needed changes are appropriate. The City's rehabilitation treatments and associated unit costs used in Easy Street are summarized in the last column of Table 11. The costs are presented on a square yard basis for each pavement type, functional class, and maintenance and rehabilitation activity combination. Treatment costs also include a small mark-up to reflect miscellaneous unit cost increases that can occur from annual variations in the construction market. Project variables, such as mobilization, traffic control, curb and sidewalk, compliance with the Americans with Disabilities Act, landscaping mitigation, or pavement striping are not included in the costs shown in Table 11.

Table 11. Easy Street Treatment Timing and Costs

Type	Rehabilitation Activity[a]	PCI			Cost (yd^2)
		Min	Critical	Max	
All	Routine Maintenance	85	100	100	$0.00
Asphalt	Preventative Maintenance	80	82	85	$0.30
Asphalt	Surface Treatment/Chip Seal	70	73	80	$3.60
Asphalt	Surface Treatment/Chip Seal + Structural Patch	70	73	80	$3.60
Asphalt	Surface Treatment/Chip Seal + Structural Patch	60	63	70	$3.60
Asphalt	Edge Mill (EM)+Thin Overlay (1.5-2 in)	60	63	70	$14.00
Asphalt	EM + Thin Overlay (1.5-2 in) + Structural Patch	60	63	70	$14.00
Asphalt	EM + Thin Overlay (1.5-2 in) + Structural Patch	50	54	60	$14.00
Asphalt	EM/Full-Width Mill (FWM) + Moderate Overlay (2-3 in)	50	54	60	$17.00
Asphalt	EM/FWM + Moderate Overlay (2-3 in) + Structural Patch	50	54	60	$17.00
Asphalt	EM/FWM + Moderate Overlay (2-3 in) + Structural Patch	40	44	50	$17.00
Asphalt	FWM + Thick Overlay (> 2-3 in)	40	44	50	$20.00
Asphalt	FWM + Thick Overlay (> 2-3 in) + Structural Patch	40	44	50	$20.00
Asphalt	FWM + Thick Overlay (> 2-3 in) + Structural Patch	25	30	40	$20.00
Asphalt	Recon + Base Rehab/FWM + Structural Patch + Overlay	25	30	40	$29.50
Asphalt	Full Depth Reconstruction	0	15	25	$45.00
Composite	Recon + Base Rehab/FWM + Structural Patch + Overlay	25	30	40	$34.50
Composite	Full Depth Recon + Concrete + Base	0	15	25	$55.00
Concrete	Joint Rehabilitation + Crack Seal	80	82	85	$3.00
Concrete	Localized Rehabilitation	70	73	80	$5.25
Concrete	Localized Rehabilitation + Grind	70	73	80	$2.25
Concrete	Slight Panel Replacement (< 10%)	60	63	70	$12.50
Concrete	Slight Panel Replacement (< 10%) + Grind	60	63	70	$12.50
Concrete	Moderate Panel Replacement (< 20%)	50	54	60	$25.00
Concrete	Moderate Panel Replacement (< 20%) + Grind	50	54	60	$25.00
Concrete	Extensive Panel Replacement (< 33%)	40	44	50	$40.00
Concrete	Extensive Panel Replacement (< 33%) + Grind	40	44	50	$40.00
Concrete	Partial Reconstruction	25	30	40	$85.00
Concrete	Full-Depth Reconstruction	0	15	25	$130.00

[a] EM – edge mill, FWM – full-width mill.

Revised Costs from Bid Tabulations

The City does not currently use all treatments listed in Table 11. Current treatments include asphalt overlays and reconstruction; however, the City is looking to add chip seals as an alternative treatment in the future, which NCE strongly supports. A review of recent bid tabulations for the City, as well as bid tabulations for Clearwater County, ID was conducted. The reviewed bid tabulations included:

- City Project No. 0141, Sullivan/Euclid PCC Intersection
- City Project No. 0142, Broadway-Argonne-Mullan PCC Intersection
- City Project No. 0240, Saltese CTB Reconstruction
- City Project No. 0251, Euclid Reconstruction
- City Project No. 0253, Mission Asphalt Overlay
- City Project No. 0254, Mission Asphalt Overlay
- City Project No. 0255, Indiana Asphalt Overlay
- City Project No. 0272, Euclid Asphalt Overlay
- Idaho Transportation Department, Project A018(729), FY 19 D2 Seal Coats

Based on previous NCE work, the following includes treatment costs used by the City of Wenatchee (note costs are all inclusive):

- Crack seal: \$1.25/yd^2
- Chip seal: \$4.70/yd^2
- Chip seal with 2 percent base repair: \$7.25/yd^2
- Thin (< 2 in) asphalt overlay with 5 percent base repair:
  - Arterial: \$29.50/yd^2
  - Collector: \$21.50/yd^2
  - Residential: \$15.00/yd^2
- Thin (< 2 in) asphalt overlay with 10% base repair:
  - Arterial: \$37.75/yd^2
  - Collector: \$36.50/yd^2
  - Residential: \$21.00/yd^2
- Reconstruction (asphalt):
  - Arterial: \$176.00/yd^2
  - Collector: \$169.50/yd^2
  - Residential: \$104.00/yd^2

Adjustment of Treatment Costs to be All-Inclusive

The City has indicated a preference to use inclusive costs (e.g., engineering, inspection, mobilization, traffic control) in the Easy Street budget scenario analysis. Therefore, an evaluation was conducted, using the City-provided bid tabs, to determine estimated all-inclusive treatment costs. This analysis included (results provided in Table 12):

- Identifying and removing “non-typical” costs (e.g., sewer systems, structures).
- Re-calculating total project cost.
- Calculating unit costs for asphalt (or concrete) pavement: costs divided by quantity.
- Calculating adjustment factor: pavement cost divided by total adjusted cost.

Table 12. Estimate for Inclusive Treatment Costs

Factor	CIP #0141 Concrete Intersection	CIP #0142 Concrete Intersection	CIP #0240 Reconstruction (asphalt)	CIP #0251 Reconstruction (asphalt)
Total Contract Cost[a]	$1,346,315	$1,197,072	$871,551	$1,586,792
Asphalt/Concrete Cost	$485,500	$435,000	$335,870	$557,499
Pavement Area	2,000 yd^3	1,500 yd^3	18,890 yd^2	24,033 yd^2
Concrete/Asphalt Thickness	Unknown	Unknown	4.0 inch	6.0 inch
Pavement Cost	$243 yd^3	$290 yd^3	$18 yd^2	$23 yd^2
Total Cost	$673 yd^3	$798 yd^3	$46 yd^2	$66 yd^2
Adjustment Factor	2.8	2.8	2.6	2.9

(a) Winning bid minus removed items.

Table 12. Estimate for Inclusive Treatment Costs (continued)

Factor	CIP #0248 Asphalt Overlay	CIP #0253 Asphalt Overlay	CIP #0254 Asphalt Overlay	CIP #0255 Asphalt Overlay	CIP #0272 Asphalt Overlay[b]
Total Contract Cost[a]	$1,310,105	$473,298	$713,921	$394,616	$1,034,027
Asphalt/Concrete Cost	$540,135	$157,860	$208,718	$160,880	$172,900
Pavement Area	54,190 yd^2	14,005 yd^2	16,047 yd^2	18,110 yd^2	5,080 yd^2
Overlay Thickness	2.5 inch	2.5 inch	2.5 inch	2.0 inch	2.0 inch
Overlay Cost	$10 yd^2	$11 yd^2	$13 yd^2	$9 yd^2	$34 yd^2
Total Cost	$24 yd^2	$34 yd^2	$44 yd^2	$22 yd^2	$204 yd^2
Adjustment Factor	2.4	3.0	3.4	2.5	6.0

(a) Winning bid minus removed items.
(b) Included extensive removal and replacement of aggregate base.

Findings

A comparison of material costs for concrete reconstruction, asphalt reconstruction, and asphalt overlays (2 to 3 inch) indicated a difference between the Easy Street base unit rate and the City's weighted average materials costs. For example, the average weighted costs for:

- Asphalt overlay (2 to 3 inch) is approximately $10/SY, while Easy Street unit base rate is $17/SY.
- Asphalt reconstruction is approximately $21/SY, while Easy Street unit base rate is $45/SY.

Based on this all-inclusive cost analysis, the treatment costs shown in Table 13 could be adjusted to be all inclusive by multiplying:

- Concrete intersection costs: 2.8
- Reconstruction (asphalt) costs: 2.7
- Asphalt overlay (excludes CIP#0272) costs: 2.3

The Easy Street treatment costs shown in Table 12 were revised by multiplying all treatment costs by 2.7 plus adding an additional 15 percent to cover the costs of engineering and inspection. In addition, the City conducted a thorough review of the estimated all-inclusive costs to ensure reasonableness based on past construction projects. The recommended all-inclusive treatment costs are shown in Table 13.

Table 13. Estimated All Inclusive Treatment Costs

Type	Rehabilitation Activity	Inclusive Rate (yd^2)[(a)]
All	Routine Maintenance	$0.00
Asphalt	Preventative Maintenance	$3.00
Asphalt	Surface Treatment/Chip Seal	$8.00
Asphalt	Surface Treatment/Chip Seal + Structural Patch	$9.00
Asphalt	Surface Treatment/Chip Seal + Structural Patch	$10.00
Asphalt	Edge Mill (EM) + Thin Overlay (1.5-2 in)	$27.00
Asphalt	EM + Thin Overlay (1.5-2 in) + Structural Patch	$28.00
Asphalt	EM + Thin Overlay (1.5-2 in) + Structural Patch	$29.00
Asphalt	EM/Full-Width Mill (FWM) + Moderate Overlay (2-3 in)	$31.00
Asphalt	EM/FWM + Moderate Overlay (2-3 in) + Structural Patch	$35.00
Asphalt	EM/FWM + Moderate Overlay (2-3 in) + Structural Patch	$38.00
Asphalt	FWM + Thick Overlay (> 2-3 in)	$40.00
Asphalt	FWM + Thick Overlay (> 2-3 in) + Structural Patch	$45.00
Asphalt	FWM + Thick Overlay (> 2-3 in) + Structural Patch	$50.00
Asphalt	Recon + Base Rehab/FWM + Structural Patch + Overlay	$60.00
Asphalt	Full Depth Reconstruction	$65.00
Composite	Recon + Base Rehab/FWM + Structural Patch + Overlay	$65.00
Composite	Full Depth Recon + Concrete + Base	$105.00
Concrete	Joint Rehabilitation + Crack Seal	$6.00
Concrete	Localized Rehabilitation	$11.00
Concrete	Localized Rehabilitation + Grind	$14.00
Concrete	Slight Panel Replacement (< 10%)	$22.00
Concrete	Slight Panel Replacement (< 10%) + Grind	$27.00
Concrete	Moderate Panel Replacement (< 20%)	$40.00
Concrete	Moderate Panel Replacement (< 20%) + Grind	$45.00
Concrete	Extensive Panel Replacement (< 33%)	$65.00
Concrete	Extensive Panel Replacement (< 33%) + Grind	$70.00
Concrete	Partial Reconstruction	$155.00
Concrete	Full-Depth Reconstruction	$240.00

(a) Recommended unit cost = base unit rate x 2.7 + 15% engineering and inspection.

Recommendations

- Increase treatment costs to reflect recent contract bid awards, inclusive costs, and costs for engineering and inspection, as shown in Table 13.

TASK 6. BUDGET ANALYSIS

Based on discussions with the City, four budget scenarios were evaluated using Easy Street. The following scenarios were selected to identify network needs and can be updated to reflect any other scenarios:

- **Scenario 1:** Budget-driven analysis, annual budget of $5M.
- **Scenario 2:** Target-driven analysis, target PCI of 70 for arterials and collectors and target PCI of 65 for local roads.
- **Scenario 3:** Budget-driven analysis, local roads only, annual budget of $1.5M.
- **Scenario 4:** Target-driven analysis, local roads only, target PCI of 70.

Many of the City's input values are in-line with standard pavement management practices. Therefore, for the scenarios evaluated in this task, modifications were not made to the existing decision trees and prediction models. However, as will be discussed, treatment costs and weighting (or multiplier) factors were changed.

Unit Cost Assumptions

The following scenarios utilize the recommended all-inclusive cost shown in Table 13. As noted in Maintenance and Rehabilitation Strategies, the baseline costs were critically reviewed and it was found that multiple items had unit costs that required adjustment in order to more accurately reflect the City's actual pavement rehabilitation project costs.

Easy Street utilizes several base unit rate modifiers to account for a variety of factors (e.g., level of distress, functional classification). Modifications to the Easy Street unit cost multipliers included:

- Unit Rate Multiplier (Parameters tab, cell H70) = 100 (cost x unit rate multiplier/100).
- Unit Rate Exp factor (Rehab Activities tab, column L) = 1.00. Easy Street values range from 1.00 (maintenance and preservation activities) to 2.00 for reconstruction. Since the recommended costs (Table 13) are based on all-inclusive costs from both rehabilitation and reconstruction, it is recommended that this factor be set to 1.0 for all treatments.
- FunCL Rate Premium (Rehab Activities tab, cells n10:s10). This factor accounts for costs associated with roadway functional classification (e.g., a higher cost is need to rehabilitate a major arterial compared to a local road). The bid item tab review was conducted on City projects located on the arterial network. Therefore, the following FunCL rate premium are recommended for use in the following scenarios:
  - Major arterials: 100
  - Minor arterials: 100
  - Collectors: 90
  - Local roads: 75
- Remove and Replace/Grinding (Rehab Activities tab, Column K). This factor applies a percent increase to account for additional pavement removal/replacement and grinding needs as a function of pavement condition. Since these costs were included in the development of the all-inclusive costs, this factor was set to zero for all treatments.

Finally, while the estimated treatment costs are based on several recent City bid tabs, it is difficult to accurately characterize unit bid prices due to fluctuations in material costs, labor rates, treatment type, treatment quantities, etc. Therefore, it is important to routinely evaluate and update treatment unit costs. Due to fluctuating costs, it is difficult to ensure 100 percent accuracy for future budget estimates.

Decision Trees

The City's current decision trees were used in the analysis of each budget scenario. For asphalt pavements, the decision tree is arranged according to PCI range and pavement strength (i.e., weak, moderate, and strong). Figure 6 illustrates the asphalt pavement work activities color-coded by treatment type.

PCI	Weak	Moderate	Strong
85-100	Routine Maintenance	Routine Maintenance	Routine Maintenance
80-84	Preventive Maintenance	Preventive Maintenance	Preventive Maintenance
70-79	Patch + Chip Seal	Chip Seal	Chip Seal
60-69	Mill + Patch + Thin Overlay	Mill + Thin Overlay	Patch + Chip Seal
50-59	Mill + Patch + Moderate Overlay	Mill + Moderate Overlay	Mill + Patch + Thin Overlay
40-49	Mill + Patch + Thick Overlay	Mill + Thick Overlay	Mill + Patch + Moderate Overlay
25-39	Reconstruction or Mill + Patch + Overlay	Mill + Patch + Thick Overlay	Mill + Patch + Thick Overlay
0-24	Reconstruction	Reconstruction	Reconstruction

Figure 6. Asphalt pavement decision tree.

For concrete pavements, the decision tree is arranged according to PCI range and roughness index (i.e., < 60 and > 60). As with asphalt pavement, Figure 7 illustrates concrete pavement work activities color-coded by treatment type.

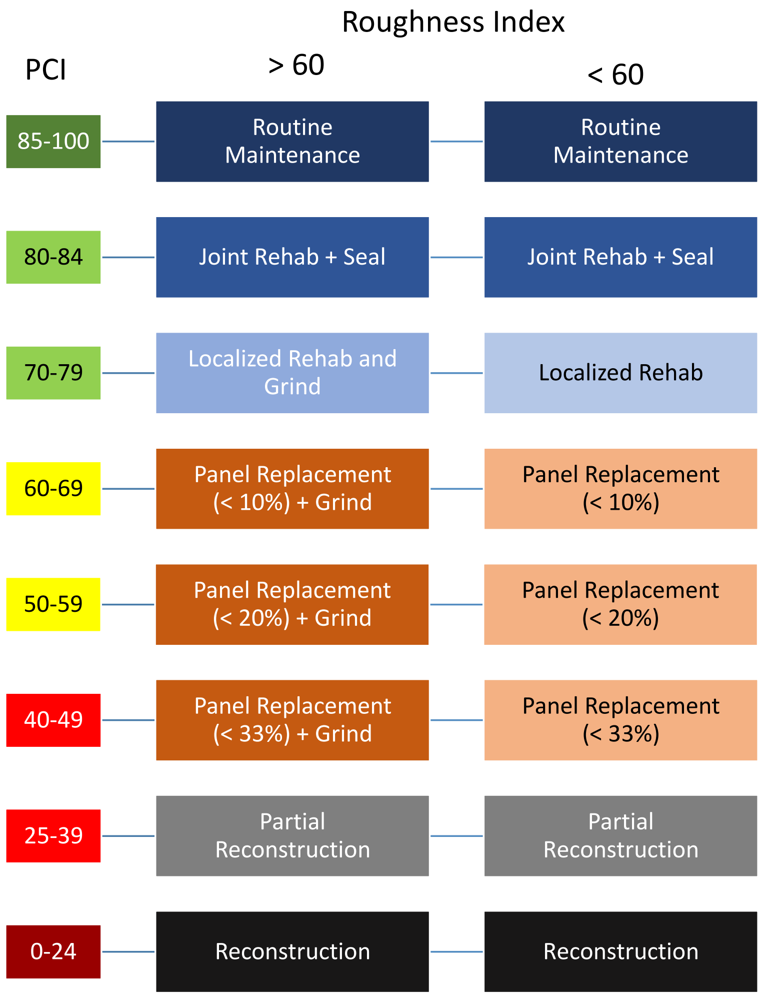


Figure 7. Concrete pavement decision tree.

Budget Analysis

Scenario 1

This scenario evaluates the current City budget of $5M/year, applied to the entire network and analyzed over a 5-year period. The primary inputs included:

- Current PCI Date: 1/1/2019
- Analysis Start Date: 1/1/2019
- Budget Dedicated to Surface Treatments: 0 percent
- Analysis Period: 5 years
- Annual Budget: $5M

The results of this scenario indicate the PCI will decrease to 65 and the backlog will increase to 11.0 percent over the 5-year period (Table 14). With this budget-driven scenario, the total expenditure over the 5-year analysis period will be approximately $25M. The current City budget is lower than the Easy Street recommended annual budget of $8.4M/year, which is the average of the budget required to maintain the current PCI ($9.4M/year) and the budget required to maintain the current backlog ($7.5M/year). The Easy Street results for Scenario 1 are provided in Appendix A.

Table 14. Scenario 1 Results

Program Year	Expenditure	Network PCI[a]	Backlog[a,b]
2019	$4,999,531	69	7.4
2020	$4,998,068	67	8.3
2021	$4,999,827	67	9.0
2022	$4,997,996	66	9.9
2023	$4,999,535	65	11.0
5-Yr Total	**$24,994,957**	—	—

(a) Initial values taken from IMS's 2017 survey data and aged to January 1, 2019 using Easy Street.
(b) Percent of pavements (by area) on the entire network, with PCI < 40.

Table 15 provides a summary of the annual expenditures by functional class and year. The analysis shows that the largest portion of the budget, over the 5-year analysis period, is allocated to the minor arterial network.

Table 15. Scenario 1 Budget Breakdown by Year and Functional Class

Program Year	Major Arterial	Minor Arterial	Collector	Local	Total Expenditure
2019	$2,983,920	$1,921,344	$0	$94,267	$4,999,531
2020	$2,214,120	$2,770,350	$0	$13,598	$4,998,068
2021	$177,550	$2,709,804	$249,084	$1,863,389	$4,999,827
2022	$976,900	$2,732,498	$1,116,391	$172,207	$4,997,996
2023	$320,160	$3,600,580	$71,400	$1,007,395	$4,999,535
5-Yr Total	**$6,672,650**	**$13,734,576**	**$1,436,875**	**$3,150,856**	**$24,994,957**

Scenario 2

This scenario evaluates the budget needed to achieve a PCI of 70 for arterial and collector roads and a PCI of 65 for local roads. The primary inputs included:

- Current PCI Date: 1/1/2019
- Analysis Start Date: 1/1/2019
- Budget Dedicated to Surface Treatments: 0 percent
- Analysis Period: 5 years
- Arterial and Collector Target PCI: 70
  Local Target PCI: 65

As shown in Table 16, to increase the PCI to 70 for arterials and collectors and local roads to a PCI of 65, over the 5-year analysis period, will require an annual budget of approximately $6.8M. This expenditure will result in a decrease in the backlog for arterials and collectors from 5.5 percent to 4.6 percent and an increase in the backlog for local roads from 7.4 percent to 10.5 percent.

It's important to recognize that a long-term budget of approximately $1.9 million for local access streets will result in a continuous decline of pavement conditions beyond year 5 of this Scenario. To maintain a long-term PCI of 65, increased funding is required.

Table 16. Scenario 2 Results

Program Year	Arterials and Collectors			Local Roads			Total Expenditure
	Expenditure	PCI[a]	Backlog (%)[a,b]	Expenditure	PCI[a]	Backlog (%)[a,b]	
2019	$4,959,906	69	5.5	$1,889,409	69	7.4	$6,849,315
2020	$4,959,621	69	5.4	$1,889,059	68	8.0	$6,848,680
2021	$4,959,005	69	5.0	$1,889,547	67	8.8	$6,848,552
2022	$4,958,847	70	4.5	$1,889,563	66	9.4	$6,848,410
2023	$4,958,707	70	4.6	$1,888,940	65	10.5	$6,847,647
5-Yr Total	**$24,796,086**	—	—	**$9,446,518**	—	—	**$34,242,604**

(a) Initial values taken from IMS's 2017 survey data and aged to January 1, 2019 using Easy Street.
(b) Percent of pavements (by area) on the entire network, with PCI < 40.

Scenario 3

Recently, the City obtained approximately $1.5M/year from garbage collection fees to be designated for the maintenance of the local road network. Therefore, this scenario determines the impact the $1.5M/year, over the next 5 years, will have on the PCI of the local road network. For this scenario, it is assumed that none of the current City budget ($5M/year) is allocated to the local road network (i.e., the segments in the local road network were extracted from the entire network and an annual budget of $1.5M was applied). The primary inputs included:

- Current PCI Date: 1/1/2019
- Analysis Start Date: 1/1/2019
- Budget Dedicated to Surface Treatments: 0 percent
- Analysis Period: 5 years
- Local Streets Annual Budget: $1.5M

The PCI for local roads drops from 69 to 64 by the end of the 5-year period and the local road backlog steadily increase to 11.5 percent (Table 17).

Table 17. Scenario 3 Results

Program Year	Expenditure	Network PCI[a]	Backlog[a,b]
2019	$1,499,503	69	7.6
2020	$1,499,786	67	8.4
2021	$1,499,796	67	9.4
2022	$1,499,004	65	10.2
2023	$1,499,357	64	11.5
5-Yr Total	**$7,497,446**	—	—

(a) Initial values taken from IMS's 2017 survey data and aged to January 1, 2019 using Easy Street.
(b) Percent of pavements (by area) on the entire network, with PCI < 40.

Similar to Scenario 2, given an annual budget of $1.5M, the PCI of the local access streets will continue to decline and the backlog will continue to increase beyond year 5. Increased funding is required to prevent the local access streets from falling into the poor condition category.

Scenario 4

This scenario determines the level of funding needed to improve the local roads network to a PCI of 70. As with Scenario 3, it is assumed that none of the City's current budget is allocated to the local roads. The primary inputs included:

- Current PCI Date: 1/1/2019
- Analysis Start Date: 1/1/2019
- Budget Dedicated to Surface Treatments: 0 percent
- Analysis Period: 5 years
- Local Streets Maintain PCI: 70

As shown in Table 18, the estimated annual budget is approximately $5M. With this level of funding, the local road backlog will steadily decrease to 3.6 percent by the end of the 5-year analysis period. With this target-driven scenario, the required total expenditures over the 5-year analysis period is approximately $25M.

Table 18. Scenario 4 Results

Program Year	Expenditure	Network PCI[a]	Backlog[a,b]
2019	$5,009,125	70	6.6
2020	$5,009,707	70	5.8
2021	$5,008,904	70	5.3
2022	$5,009,676	70	4.4
2023	$5,009,491	70	3.6
5-Yr Total	**$25,046,903**	—	—

(a) Initial values taken from IMS's 2017 survey data and aged to January 1, 2019 using Easy Street.
(b) Percent of pavements (by area) on the entire network, with PCI < 40.

Comparison

As described above and summarized in Table 19, it is estimated that the current City budget (Scenario 1: $5M/year) will result in a decline in the network PCI and an increase in the backlog percent over the next 5-year period. Targeting a PCI of 70 for arterials and collectors and allowing the local road network to decline to a PCI of 65 (Scenario 2) requires an annual budget of approximately $6.9M; however, the percent backlog for local roads will increase to 10.5 percent. For the local road network, dedicating only the garbage collection fee ($1.5M/year) will results in a decline in the PCI to 64 over the 5-year period (Scenario 3); however, to maintain a PCI of 70 will require an annual budget of approximately $5M (Scenario 4).

Although evaluation of a long-term analysis period (> 10 years) is currently unavailable in Easy Street, it can be expected that without an increase in the City's annual pavement budget, continued decline in pavement condition can be expected.

Table 19. Scenario Comparison

Scenario	PCI (Backlog %)					5-Year Annual Expenditure[a]
	2019	2020	2021	2022	2023	
1. Current City Budget	69 (7.4)	67 (8.3)	67 (9.0)	66 (9.9)	65 (11.0)	$5,000,000
2. Target Driven by Functional Class						$6,860,000
Arterials and Collectors (PCI 70) &	69 (5.5)	69 (5.4)	69 (5.0)	70 (4.5)	70 (4.6)	$4,960,000
Local Roads (PCI 65)	69 (7.4)	68 (8.0)	67 (8.8)	66 (9.4)	65 (10.5)	$1,900,000
3. Local Roads ($1.5M/year)	69 (7.6)	67 (8.4)	67 (9.4)	65 (10.2)	64 (11.5)	$1,500,000
4. Target Driven Local Roads (PCI 70)	70 (6.6)	70 (5.8)	70 (5.3)	70 (4.4)	70 (3.6)	$5,010,000

(a) Average annual costs where applicable.

Recommendations

The following recommendations are based on the results of the budget analysis:

- Consider dedicating a portion of the annual budget to preventive maintenance to preserve streets already in good condition.
- Pursue additional funding sources to ensure target-driven scenarios are feasible.
- Request IMS to update Easy Street for analysis periods greater than 5 years (e.g., 20 years).
- Consider using decision-support tools that include:
  - Optimizing budget percent dedicated to preventive maintenance on a yearly basis.
  - Allowing target values by functional class for network-wide analyses.

A summary of Easy Street parameters, current City values, and NCE recommended values are shown in Table 20.

Table 20. Assessment of Budget Analysis Input Parameters

Input Parameter	Current Value	Recommended Value
Analysis Period	≤ 5 years	≤ 20 years[a]
Backlog limit	PCI < 40	No recommended changes
Decision tree	See Figures 6 and 7	No recommended changes
Functional class priority factors	100, 80, 60, or 40 for major arterial, minor arterial, collector, and local roads, respectively	No recommended changes, values are representative of typical practice
PCI	Overall network	Allow PCI targets by functional class[a,b]
Percent budget dedicated to surface treatments	0	10 or optimized for each budget scenario
Treatment costs	See Table 13	Update to reflect actual costs

(a) Requires Easy Street modification.
(b) City noted that this is an Easy Street function; however, it is not intuitive how this can be conducted in the current version.

TASK 7. RECOMMENDED TOOLS AND TRAINING

The following provides recommendations on software tools to improve the current pavement management process, to improve efficient use of the pavement management program, or in support of implementing a different pavement management. In addition, City staff training needs related to the pavement management process are provided.

Software Tools

The primary tool in the pavement management process is the pavement management software. Ideally, the components of a pavement management system include:

- Data collection:
  - Inventory: number of lanes, section length, section width, surface type, functional classification, shoulder type (e.g., unpaved, curb and gutter, sidewalk, and width).
  - Work history: date of construction, type of treatment, thickness of treatment (when applicable).
  - Condition survey: roughness or ride (International Roughness Index), rut depth, pavement distress (type, severity, and extent), and condition index.
  - Traffic: truck type, truck count
- Data analysis:
  - Investment strategies: single- and multi-year analysis, various budget scenarios.
  - Performance analysis: pavement performance prediction, estimate expected life.
  - Engineering analysis: design evaluation, preservation and rehabilitation treatments, materials, and mix designs.
  - Feedback analysis: evaluate procedures, recalibrate performance prediction models.

In general, a pavement management system provides the user with the information needed to track pavement condition, predict future performance, identify treatment type and timing, determine budgetary needs and impacts of constrained budgets and different treatment types and timing, and support agency accountability efforts. Other potential tools include applications for hand-held pavement condition assessment, GIS, and integration with other asset management systems.

Assessment of Easy Street

Easy Street meets the majority of the pavement management system components. Table 21 provides a summary of the Easy Street components and NCE's assessment of sufficiency. Based on Table 21, the major hindrance to the current pavement management process is the lack of previous detailed pavement condition data (severity and extent for each distress type) and work history data. In its current format, the exclusion of detailed pavement condition data and work history information from Easy Street is considered to be a significant shortcoming to the pavement management process.

Table 21. Easy Street Components

Category	Component	Easy Street Component?	Discussion
Inventory Data	Number of lanes	No	Could be estimated
	Section length	Yes	—
	Section width	Yes	May not be accurate[(a)]
	Surface type	Yes	—
	Functional classification	Yes	—
	Shoulder information	Yes	However, all values are null
Work History	Construction date	No	Information is needed to assess treatment performance
	Treatment type	No	
	Treatment thickness	No	
Condition Survey Data	Roughness or ride	Current year only	Detailed pavement condition data (type, severity, and extent) is needed to confirm prediction models and assess performance of different treatment types and materials
	Pavement distress	PCI deduct values	
	Rut depth	Current year only	
	Condition index	Current year only	
Traffic Data	Truck type	No	Not an essential component; although not as accurate, functional classification is often used in lieu of truck data
	Truck count	No	
Performance Analysis	Performance prediction	Yes	Internal equations; unknown if updated after each survey cycle
	Treatment life	Yes	Only includes 5-year assessment; predicted year would be helpful
	Decision tree	Yes	Preservation treatments not included; consider adding a chip seal program
Investment Analysis	Single- and multi-year	Limited to < 5 years	Longer-term analysis maybe beneficial (10 – 20 years)
	Budget scenarios	Yes	Budget- & target-driven
Engineering analysis	Evaluate designs, preservation and rehabilitation treatments, materials, and mix designs	No	Analysis is typical conducted outside of the pavement management system; however, complete inventory, historical, and condition survey data is needed

(a) Based on roads included in quality control assessment (Task 11); however, City noted data provided to IMS was based on review of Google images.

Desirable Functions of a Pavement Management System

A questionnaire was provide to the City to assess the desirable functions of a pavement management software. City staff identified a number of "must have" attributes and features including the ability to evaluate "what if" budget scenarios, funding level needed to maintain a specified PCI level, identify unfunded backlog and percent of streets in good, poor, and failed condition, and the ability to include customizable treatment costs (Table 22). The City staff-identified "must have" attributes and features are currently included in Easy Street. Easy Street supports some of attributes and features listed in Table 22; however, it does not currently allow for the inclusion of work history, previous survey results, and stop-cap costs, evaluation of long-term (> 5 years) budget scenarios, GIS integration, development of standard or customizable reports, and GASB reporting. If the City determines these attributes are important, discussion with IMS for inclusion or evaluation of other pavement management programs is recommended.

Table 22. Summary of Desirable Functions of Pavement Management Software

Software Features	3 - must have, 2 - desirable, 1 - desirable but not necessary, 0 - not needed					Easy Street
	Bill	Colin	Mike	Adam	Average	
Budgetary Analysis						
"What-if" funding scenarios	3	3	3	3	3.00	Yes
Funding level to maintain PCI	3	3	3	3	3.00	Yes
Multi-year work plan	3	3	3	2	2.75	Yes[a]
Committed projects	2	3	3	3	2.75	Yes
Customizable prediction models	2	3	3	2	2.50	No[b]
Default performance prediction models	3	2	1	3	2.25	Yes
Stop-gap costs	2	2	3	2	2.25	No
“Packaging” projects	2	1	3	2.5	2.13	Yes
Additional Performance Measures						
Unfunded backlog	3	3	3	3	3.00	Yes
Percent of good, poor, failed streets	3	3	3	3	3.00	Yes
Maintenance and Rehabilitation						
Customizable unit costs	3	3	3	3	3.00	Yes
Customizable thresholds	2	3	3	3	2.75	Yes[c]
Customizable M&R decision tree	2	3	3	2.5	2.63	Yes
GIS Integration						
List desired queries	2	3	3	—	2.67	No
Exportable shapefiles	2	3	3	—	2.67	No
Internal GIS module	2	2	3	2	2.25	No
Reports						
Customizable Reports	3	3	3	2	2.75	No
Graphs	3	3	2	—	2.67	Yes[d]
Standard Reports	3	2	1	2.5	2.13	No
GASB	2	—	—	—	2.00	No

(a) Limited to 5 years.
(b) Easy Street “Curve Calcs” tab includes performance model information, but will require IMS to conduct changes.
(c) Overall network only; could be beneficial to allow PCI targets by functional classification.
(d) Not customizable.

Training

Suggested training topics are provided in Table 23. Training has been arranged according to level of importance, with a “1” being the most important. In addition to the recommended training, it is also recommended that the City develop a “desk manual” that documents, for example, the process of evaluating the information received from IMS, step-by-step procedures for conducting any needed analyses, and information included in reports to upper management and the City Council.

Table 23. Recommended Training

Topic	Importance	Discussion
Data quality management	1	Describe the importance of data quality, standards and requirements, maximize accuracy, repeatability, etc.
Software function and operation	1	Describe functionality, how to conduct various analyses, discuss results, and information to report
Performance prediction	2	Describe importance, what data is needed, what analysis is conducted, and how results are verified
Budget analysis	2	Describe how the analysis is conducted, target- and budget-driven analysis, and assessing next steps
Treatment selection	2	Describe applicable treatment types, timing, and costs, and construction activities
Condition surveys	3	Describe manual, semi-automated, and automated condition surveys, focusing on the latter

Recommendations

Based on the contents of the current version of Easy Street, previous versions (2010, 2013, and 2015) can be accessed and distress types and PCI deduct values extracted. It is recommended that the City:

- Request IMS to populate Easy Street with the detailed results of all pavement condition surveys, including the survey year, and severity and extent of each distress type.
- Request IMS to populate Easy Street with a work history of the road network, including construction year, layer or treatment type, and thickness.
- Provide staff training.
- Develop a “desk manual” that documents, for example, the process of evaluating the information received from IMS, step-by-step procedures for conducting any needed analyses, and information included in reports to upper management and the City Council.

While the addition of this information does not appear to impact the current functionality of Easy Street (e.g., add data into separate worksheets), maintaining a history of pavement condition assessment and work history is an essential component of a pavement management system.

Additionally, in the event the City determines that the recommended functionality modifications to Easy Street are cost prohibitive, and the inclusion of stop-cap costs, GIS integration, standard or customizable reports, and GASB reporting is important, it is recommended the City evaluate other pavement management programs.

TASK 8. PUBLIC OUTREACH

The following provides recommendations for public outreach activities in support of pavement management. Recommendations are based on efforts conducted by NCE for other local agencies.

City Council Workshops

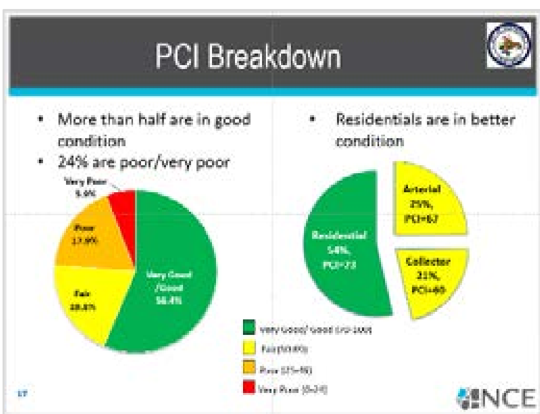
Target new members and members wanting a refresher. Each workshop would be no more than 2 hours in length, and cover sufficient information to provide understanding, but not necessarily specific details (e.g., discuss performance modeling without getting into the statistical analysis component). For each workshop, participants would be provided a briefing document that summarizes the information; this way the information can be used for future reference, as well as for future Council workshops. Potential workshops include:

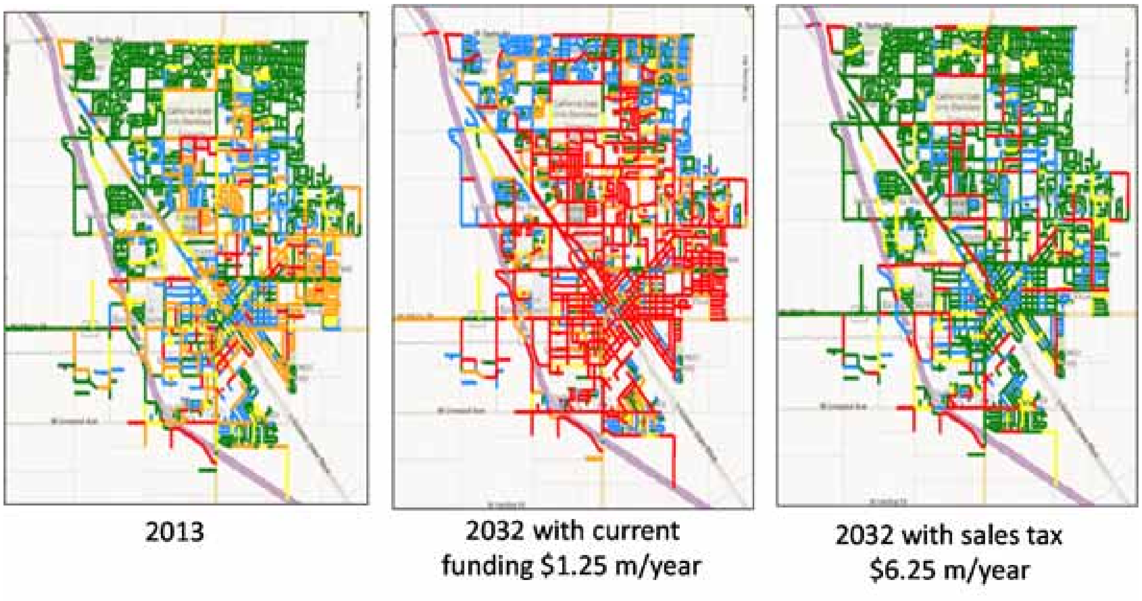
- How pavements perform (a.k.a., why pavements fail).
- Pavement management basics (e.g., types of distress, how distress is measured, treatment types, timing, and costs, performance prediction, budget analysis).
- Budget analysis (e.g., how performance models are used to estimate budgetary needs, how to select cost-effective treatments and when to apply them).

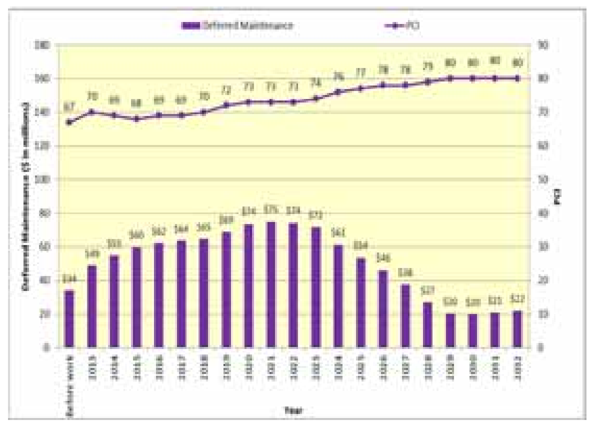
City Council Presentations

Ideally, City Council presentations on pavement management would be conducted on a regular schedule, although in reality this is not always possible. The presentations would provide updates on how the City is meeting its pavement management goals. The information shared could include (each presentation would not necessarily include the same information):

- What street network does the City own/maintain?
- What condition is it in?
- What repairs are needed and when?
- How does the City cost-effectively maintain or improve streets?
- How are funding needs determined and how does it impact pavement condition?
- Examples of information to share may include:



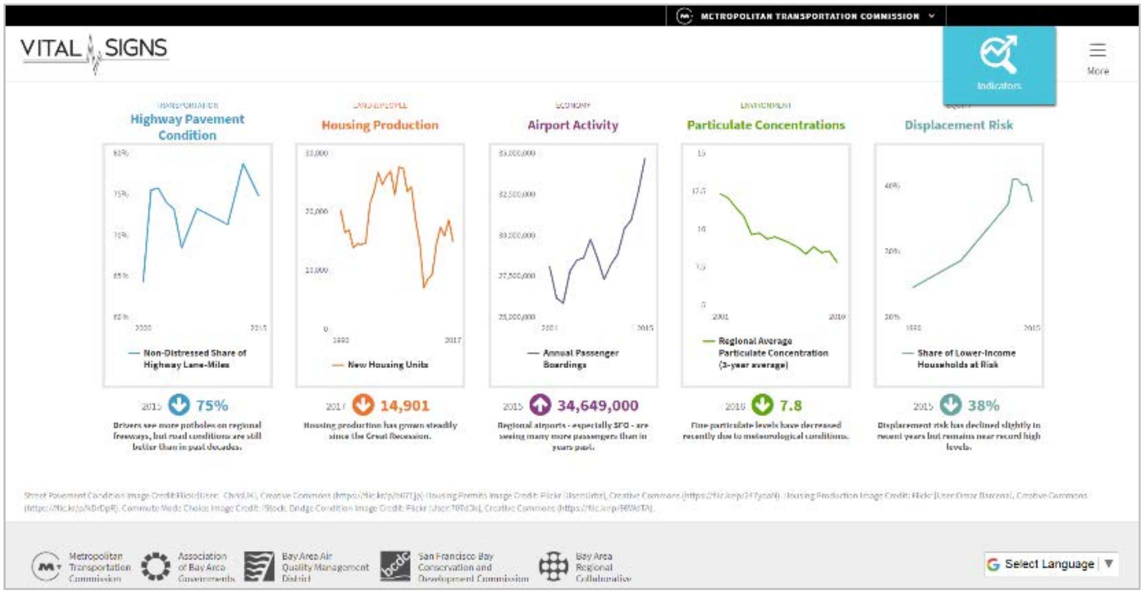


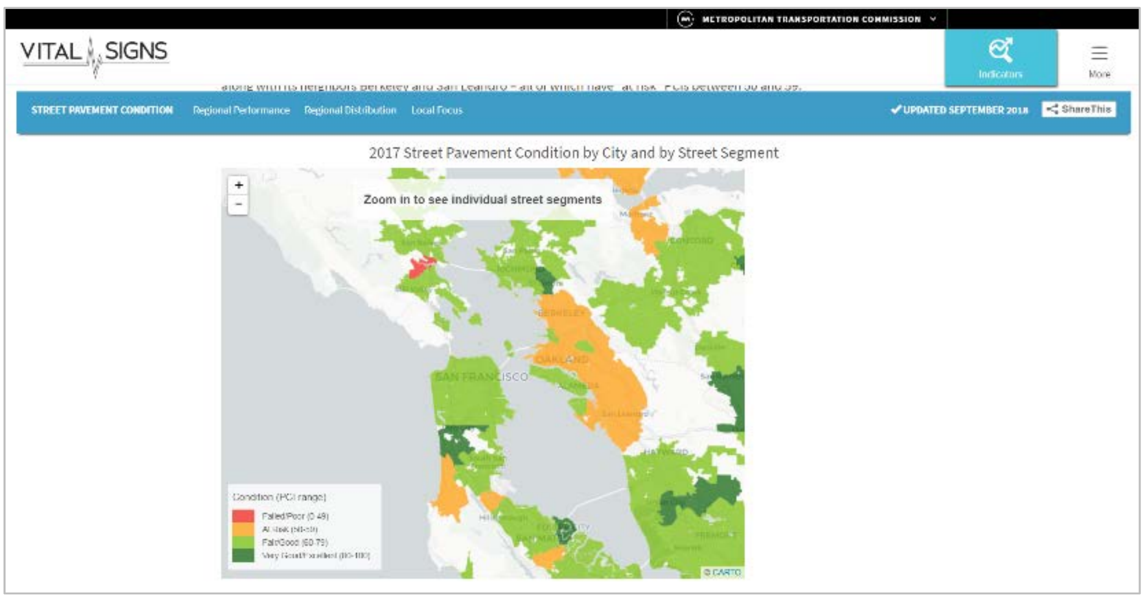


Develop Social Media Content

Social media is typically used to announce construction projects, traffic delays, etc., and less in relation to pavement management. This is because relatively little pavement management information is of interest to the masses, and thankfully, also because pavements do not deteriorate rapidly where a media blast would be important.

Figures 8 through 10 provide examples of agency performance measure websites:





Source: http://www.vitalsigns.mtc.ca.gov/street-pavement-condition.

Figure 8. Performance measures for the San Francisco Metropolitan Transportation Commission.

BALANCED TRANSPORTATION

GOAL Reduce reliance on single occupancy vehicles and improve connectivity and multi-modal mobility in Kirkland in ways that maintain and enhance travel times,safety and transportation choices.

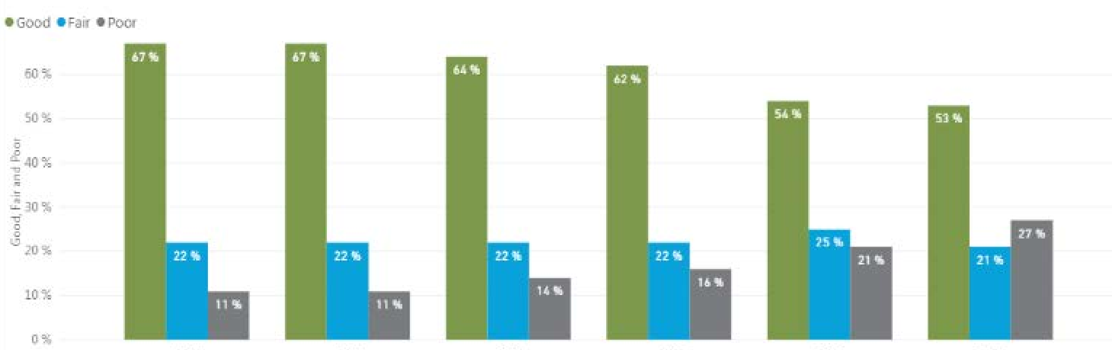
	MEASURE	2013	2014	2015	2016	2017	Target
The City funds active transportation options	*Percent of Capital Improvement Program Transportation funding devoted to Active Transportation*	38%	36%	41%	32%[1]	31%[1]	33%
So that... **The City can implement the adopted Active Transportation and Intelligent Transportation System Plans**	*Percent of proposed Intelligent Transportation System (ITS) projects completed*	37%	38%	62%	63%	94%	100% of ITS Strategic Plan
	Complete sidewalk construction on at least one side of all school walk routes	89%	89%	89%[2]	90%	90%[3]	100% by 2019
	Percent of bicycle network construction improvement projects completed	64%	64%	71%[4]	71%[4]	79%	100% by 2018
	Percentage of designated arterials that are complete streets	60%	60%	60%	62%	62%	100%
So that... **Kirkland has an integrated multi-modal system of transportation that provides mobility and safe travel**	*Residents surveyed are satisfied with maintenance of active transportation facilities*	[5]	82%	[5]	No Data	[5]	90%
	Automobile crashes involving bikes	25	14	24	16	18	0
	Automobile crashes involving pedestrians	23	27	28	24	20	0

Source: http://www.kirklandwa.gov/depart/CMO/Reports/Performance_Measures.htm.

Figure 9. Performance measures for the City of Kirkland, WA.

Arterial street rating

Street Conditions are measured in order to prioritize maintenance needs. The rating is from 0 to 100, with 100 being a brand new street. The categories are classified as Good from 70 to 100, Fair from 50 to 70, and Poor from 0 to 50. This rating system does vary from city to city with Spokane currently using the higher end of the number scale.
The goal of the City is to keep Good Streets good and improve on the streets that require additional maintenance.



Source: https://my.spokanecity.org/performs/.

Figure 10. Performance measures for the City of Spokane, WA.

Conduct Town Hall Meetings

Similar to the City Council Workshops, Town Hall meetings would provide information specific to the interests of business owners and residents. Potential topics include:

- How the City manages the pavement network (similar to pavement management basics).
- How the City tracks pavement condition.
- How funding impacts street condition.
- City activities for managing the pavement network.

Additional topics of interest could be included based on input from the public.

TASK 9. IMPLEMENTATION ACTIVITIES

The following includes an assessment of the City pavement management system implementation status and needed activities.

Roadway Network and Inventory Data

The City has a well-established GIS that identifies the road network. It was noted during the quality control evaluation that roadway widths were not accurately reported. To improve estimates of treatment application quantities and costs, it is recommended that roadway widths be verified and updated as needed.

Pavement Condition Data Collection

The current pavement condition data collection procedure is conducted using automated data collection and semi-automated pavement review. Distress assessment is in accordance with ASTM D6433. As technology advances, consideration of 3D data analysis is recommended.

One potential shortfall of the current pavement condition data reporting process is the lack of pavement condition history. Easy Street does not include previous PCI results for those roads that have received multiple pavement condition surveys. Having a historical record of pavement condition is critical for evaluating pavement performance prediction models and for assuring pavement condition ratings from one cycle to the next are reasonable. It is understood this information is available from previous years submittals, but extracting and manipulating the data could be challenging and time consuming. It is recommended that the City request historical condition data be included with each survey cycle data submittal.

The City currently conducts the pavement condition survey on a slightly lower cycle than ideal. Therefore, it is recommended that the City consider and increase the frequency of the pavement condition survey to:

- Arterial and collector network (100 percent survey every 2 years) and half of the local road network (100 percent survey every 4 years) or
- All arterials (100 percent survey every 2 years), 50 percent for collectors (100 percent survey every 4 years), and 33 percent for local roads (100 percent survey every 6 years).

Finally, it is recommended that the City develop and implement a pavement condition data collection quality management plan to verify data collection and analysis meets the specified procedures, protocols, and standards (including quality control and data acceptance).

Pavement Condition Targets

The City's pavement condition targets were compared to other local agencies in the Pacific Northwest. The City's targets are slightly lower than other agencies and the City's overall road network condition (PCI score) declines approximately 1 PCI point every year. At this time, the current budget level is not sufficient to meet the City's current pavement condition targets. While the City has generally been able to maintain the overall road network in good condition (PCI > 60), additional funding is required to sustain the City's current overall road network target PCI of 70. In the event additional funding can be secured, it is recommended that the City consider increasing its overall pavement condition target to a PCI greater than 70.

Maintenance and Rehabilitation Decision Tree

The City's maintenance and rehabilitation decision tree was reviewed and an assessment of treatment types, PCI trigger values, costs, and expected life was conducted. The treatment types and PCI trigger values for different rehabilitation/treatment options was found to be in line with industry standards.

Further, the expected life for each unique rehabilitation/treatment option was also found to be in line with industry standards. As recognized by the City, the treatment costs included in Easy Street are lower than actual estimated costs. It is recommended the City increase treatment costs to directly reflect actual bid tabulations. In addition, while included in the decision tree, preservation treatments are not currently utilized; therefore, it is recommended, as a minimum, that the City assess the potential of including chip seals as a treatment option for asphalt pavements.

Pavement Management System

Easy Street meets the majority of the pavement management system components. However, a significant shortcoming of the current version of Easy Street is the lack of previous detailed pavement condition data (distress type, severity, and extent) and work history data (construction year, layer or treatment type, and thickness). In addition, City staff identified stop-gap cost analysis, GIS integration, and customizable reports and graphs as desirable features; however, these are unavailable in the current version of Easy Street. If the City determines these features are important, discussion with IMS for inclusion or evaluation of other pavement management programs (e.g., Paver™, StreetSaver®) is recommended.

Performance Prediction Models

Easy Street includes pavement performance prediction models; however, verification of how well the performance prediction models reflect in-field performance was beyond the scope of work. In the event previous survey data is made available, how well the prediction models relate to field performance can be assessed. In addition, the performance models included in Easy Street cannot be modified by the City and require IMS assistance to make any changes; considering the impact, this is typical of commercial pavement management system software.

Funding Estimate

Easy Street is capable of analyzing the following budgetary factors:

- Target-driven – agency-specified PCI level to be achieved by the end of the analysis period. The default PCI value is 72.
- Budget-driven – agency-specified budget for each year (can be different from year-to-year) of the analysis period.
- Recommended (Easy Street) budget – highest budget of 1) the average steady state budget and maintain current backlog budget, 2) the PCI control budget, or 3) the backlog control budget.
- Steady state – maintains the existing PCI level over the analysis period.
- Maintain existing backlog – maintains the existing backlog percent over the analysis period.
- PCI control – maintains the PCI above a minimum value. The default PCI value is 65; however, this value can be modified by the user.
- Backlog control – maintains the backlog below a minimum percent over the analysis period. The default backlog value is 12 percent and can be modified by the user.
- Fix all averaged – budget needs analysis that determines how much money is needed to perform all maintenance and rehabilitation treatments at the optimum time.
- Target backlog – agency-specified backlog percent by the end of the analysis period. The default value is 10 percent.

Easy Street currently includes a good selection of budget scenario analyses, and is comparable to other pavement management software programs. However, Easy Street currently lacks the ability to conduct analyses beyond a 5-year period.

Reporting

Easy Street is not currently set up to generate user-specified data tables, graphs, or reports. However, the needed information to do so is contained within Easy Street, and to an extent, in the IMS reports. Easy Street includes several premade graphs (e.g., backlog versus annual budget, PCI versus annual budget, backlog by budget level) that can be used as is or modified by the user.

Feedback Loop

Easy Street appears to be a powerful tool that follows pavement management principles. Although a spreadsheet application provides flexibility for both the developer and users, its operation can be a bit cumbersome (e.g., multiple tabs, several hidden tabs, tabs that may not be used by a given agency) and time consuming to conduct the analysis. The lack of a user guide is considered to be a critical issue. If the City continues utilization of Easy Street, it is highly recommended that IMS be asked to provide a user guide, as well as hands-on training and supporting materials. The user guide (and training materials) should not only include discussion of functionality, but should also include information related to, for example, performance model development, budget analysis, and project and treatment selection. Having this information will be essential for new staff, as a reference to existing staff, and in the event of staff turnover.

The City currently has a single staff member responsible for pavement management. Although there may not be a need for additional pavement management staff, it is highly recommended that the current process be well documented. Documentation could include the development of a desk manual that contains, for example, an Easy Street operational manual, step-by-step processes documenting the City's evaluation of data and results, and generation of tables, figures, and other reporting information.

Based on discussions with the City, a number of staff training needs were identified. These training needs would greatly assist current staff as well as incoming staff in the understanding of the pavement management process, software, and implications on budgetary needs and analyses. Recommended training topics include:

- Data quality management plans.
- Easy Street operation and functionality.
- Pavement performance prediction modeling.
- Budgetary analysis.
- Treatment type selection, timing, performance, and cost.

In relation to City Council members, a number of workshops and presentations would be helpful to aid in illustrating the significance and importance of a pavement (or asset) management process. An essential component of workshops and presentations is to provide a unified message that illustrates the pavement (or asset) management procedure, the importance of data collection, the accuracy of performance prediction, and the impact on budget and network performance. Having a reliable pavement management process that City Council members understand, and that consistently delivers a similar message from year-to-year, will greatly improve the credibility of the City pavement-related recommendations. Potential City Council workshops and presentations include:

- Workshops:
    - How pavements perform (a.k.a., why pavements fail).
    - Pavement management basics (e.g., types of distress, how distress is measured, treatment types, timing, and costs, performance prediction, budget analysis).
    - Budget analysis (e.g., how performance models are used to estimate budgetary needs, how to select cost-effective treatments and when to apply them).

- Presentations:
  - What street network does the City own/maintain?
  - What condition is it in?
  - What repairs are needed and when?
  - How does the City cost-effectively maintain or improve streets?
  - How are funding needs determined and how do they impact pavement condition?

At this time it appears that Easy Street will meet potential future changes in data collection technology, additional or revised analysis procedures, and software and hardware upgrades. Although the number of records in Easy Street does not exceed the capabilities of Microsoft Excel, it is uncertain if this may become an issue in the future.

Recommendations

The following provides both short- and long-term recommendations for pavement management implementation activities.

Short-Term (1 to 2 years)

- Pursue additional funding sources to ensure target-driven network scenarios are feasible.
- Request detailed historical condition data (e.g., survey year, distress type, severity, and extent) be added to Easy Street for each pavement condition survey conducted to date.
- Request IMS to add work history data (construction year, layer or treatment type, and thickness) to Easy Street.
- Request Easy Street user guide and supporting materials, and potential for having hands-on training.
- Consider increasing treatment costs to directly reflect actual bid tabulations.
- Request Easy Street be updated to include analyses beyond a 5-year period.
- Conduct pavement condition surveys at a higher testing frequency.
- Develop and implement a pavement condition data collection quality management plan.
- Assess the inclusion of preservation treatments (e.g., chip seals) for asphalt pavements.
- Determine importance of including stop-gap cost analysis, GIS integration, and customizable reports and graphs in the pavement management program. If determined to be important, discuss with IMS or evaluate other pavement management programs (e.g., Paver™, StreetSaver®).
- Develop standard and customizable reporting requirements.
- Document current pavement management process (e.g., desk manual).
- Develop a public outreach program/schedule that promotes and develops the City's pavement management program, including preparing and delivering City Council Workshops, City Council pavement management presentations, social media content, and Town Hall Meetings.

Long-Term (3 or more years)

- Verify and update roadway widths to improve the accuracy of maintenance and rehabilitation costs estimates.
- Consider increasing overall pavement condition target to a PCI greater than 70.
- As technology advances and is verified, consider requiring 3D data analysis as part of the pavement condition data survey contract.
- Validate pavement performance prediction models.
- Address all IMS-specific recommendations from Task 3 regarding Easy Street's functionality.

- Provide staff training on:
    - Data quality management plans.
    - Easy Street operation and functionality.
    - Pavement performance prediction modeling.
    - Budgetary analysis.
    - Treatment type selection, timing, performance, and cost.

TASK 11. PAVEMENT CONDITION SURVEY QUALITY CONTROL

A manual survey in accordance with ASTM D6433 was conducted by NCE on approximately 5 percent (or 241 sections) of the City's pavement network. The samples were distributed among arterials, collectors, and local streets and included both asphalt and concrete pavements. The PCI from the manual (quality control) survey was calculated and compared to Easy Street PCI results. The results of this comparison, as well as the selection process for the QC survey samples and the construction of the Paver™ pavement management software database into which the QC survey data was entered as described below.

Selecting Samples for the QC Survey

To ensure the samples were distributed among functional class, pavement condition, and surface type, the following describes the selection process:

1. Sort each segment of the pavement network by functional class.
2. Generate separate Microsoft Excel worksheets for each functional class.
3. Copy segment inventory data to the respective worksheet.
4. Sort segments in each worksheet by PCI value.
5. Define condition categories by PCI range (see Figure 2).
6. Generate separate worksheets for each functional class-PCI category. For example, create worksheets for "collector-excellent" and "minor arterial-very good," etc.
7. Randomize pavement segments within each functional class-PCI category worksheet.
8. Select the first 5 percent of pavement segments in each functional class-PCI category worksheet for inclusion in the QC survey.

By following this process, the pavement segment samples were distributed among functional classes as well as condition categories.

A check was conducted to ensure there were a representative number of concrete and asphalt samples. The City network (by area) is comprised of 99 percent asphalt pavements and 1 percent concrete pavements. In total, of the 241 samples, 238 samples (or 99 percent) were on asphalt pavements, and 3 samples (or 1 percent) were on concrete pavements.

Table 24 summarizes the distribution of pavement segment samples by pavement condition and functional class.

Table 24. Summary of Pavement Segment Sample Distribution

Functional Class	Pavement Condition				
	Excellent	Very Good	Good and Fair	Poor and Very Poor	Total
Major Arterial	3	1	5	1	10
Minor Arterial	9	7	16	1	33
Collector	4	4	7	1	16
Local	72	39	60	11	182
Total	**88**	**51**	**88**	**14**	**241**

QC Survey

The QC survey was conducted between October 8 through 19, 2018 by an accredited NCE pavement distress rater. Distress type, severity, and extent, and segment length and width were measured for each pavement segment sample. The location of the QC segments are shown in Figure 11.

Figure 11. 2018 QC survey locations.

Paver™ Database Construction

After the QC survey was completed, a database was constructed using the Paver™ pavement management software (http://www.paver.colostate.edu/). Paver™, originally developed for the Department of Defense, is a pavement management tool that uses pavement condition data to calculate PCI, develop pavement performance curves, and predict future maintenance and rehabilitation needs. Paver™ is one of several pavement management software tools used by NCE and was selected for this project to calculate PCI from pavement condition data collected during the QC survey. The Paver™ database was populated using the GISID previously assigned to each pavement segment sample and Section IDs were assigned sequentially along the road. If multiple surface types existed on a given road segment, each surface type was assigned its own Section ID number.

Comparison of Distress Types, Counts, and Quantities

The distress types from the IMS survey (obtained from Easy Street) were compared to the distress types noted during the QC survey. Distress quantities were used to determine the most prevalent distress identified during the QC survey. For asphalt pavements, weathering was the most prevalent distress type, followed by longitudinal and transverse cracking and alligator cracking. For concrete pavements, the most prevalent distress types included shrinkage cracking and joint seal damage.

The distress severity and extent are not provided in Easy Street (only distress type and PCI deduct values are included); therefore, the identification of the most prevalent distress types for the IMS survey is based on distress count (i.e., the number of distress occurrences). For the IMS surveys, the most prevalent asphalt pavement distress types included raveling, longitudinal and transverse cracking, and alligator cracking. For concrete pavements, the IMS survey identified distresses included only two occurrences each of faulting, linear cracking, and scaling/crazing.

A comparison of distress type, count, and quantity (QC survey only) and the percent difference between the QC and IMS survey counts are provided in Table 25. The information provided in Table 25 only includes QC sample pavement segments with IMS survey results from 2015 and 2017. Older pavement segments—two of the pavement segment samples were last surveyed by IMS in 2010 and 51 pavement segments where last surveyed in 2013—were excluded from this comparison due to the uncertainty of distress progression between the 2018 QC survey and the 2010 and 2013 IMS surveys.

Table 25. Comparison of Distress Types, Count, and Quantity

Distress Type	QC Survey		IMS Survey Count	Count % Difference[a]
	Count	Total Quantity		
Asphalt Pavements				
Alligator cracking (ft^2)	122	83,812	100	18
Bleeding (ft^2)	6	1,035	3	50
Bumps and sags (ft)	19	875	0	100
Depression (ft)	27	2,660	0	100
Distortions (ft^2)	0	0	24	-100
Edge cracking (ft)	37	5,361	16	57
Lane/Shoulder drop-off (ft)	34	4,269	0	100
Longitudinal and transverse cracking (ft)	174	93,644	149	14
Potholes (count)	5	6	78	-1460
Raveling (ft^2)	57	3,373	179	-214
Rutting (ft^2)	13	24,576	38	-192
Swell (ft^2)	14	627	0	100
Weathering (ft^2)	175	2,846,056	0	100
Concrete Pavements				
Corner spalling (ft^2)	3	13	0	100
Faulting (no. of slabs)	0	0	2	-100
Joint seal damage (entire section)	3	283	0	100
Joint spalling (no. of slabs)	8	100	0	100
Linear cracking (no. of slabs)	4	102	2	50
Scaling/Crazing (no. of slabs)	1	2	2	-100
Miscellaneous				
Patches/Utility cut (ft^2)	99	88,525	78	21
Polished aggregate (ft^2)	9	2,484	2	78
Railroad crossing (ft^2)	5	4,136	0	100

(a) Negative value indicates IMS survey results are higher than the QC survey results.

Based only on distress count, the percent difference between the more “critical” distress types (distress types that tend to indicate the need for treatment), are within 20 percent for asphalt pavements, and includes alligator cracking, and longitudinal and transverse cracking. Also of interest is that the IMS survey did not identify bumps and sags and depressions (counts of 19 and 27 for the QC survey, respectively), while the QC survey did not identify any distortions (count of 24 for the IMS survey). It should be noted that undulations in the road surface are more accurately characterized by the International Roughness Index, which is included as part of the IMS survey. For concrete pavement samples, the IMS survey did not identify several distress types that were noted in the QC survey (e.g., linear and shrinkage cracking, joint spalling). Not specific to a single pavement type, there was relatively good agreement for patches/utility cuts between the QC and IMS surveys.

Comparison of Calculated PCI

As noted, the IMS surveys were conducted in 2010, 2013, 2015, and 2017. A breakdown of the IMS condition survey and the number (and percent) of pavement segments included in the QC sample is shown in Table 26. Ideally, the QC survey should be conducted within 4 weeks (prior to or following) the IMS survey to minimize the potential difference in distress propagation. Therefore, rather than comparing the 2018 QC survey PCI results to IMS PCI results that could be up to 5 years old (excluding the two samples that were last rated by IMS in 2010), a comparison of measured PCI to predicted PCI was conducted.

Table 26. Summary of IMS Survey Year and Number of QC Samples

IMS Survey Year	No. of QC Samples	% of Total Samples
2010	2	0.8
2013	51	21.2
2015	99	41.1
2017	89	36.9

Although a thorough evaluation of the Easy Street pavement performance prediction models was not included in the scope of work, an analysis of the QC samples was conducted to determine the accuracy of the Easy Street performance prediction models for asphalt pavements. Inventory data was extracted and the PCI for 2018 was predicted using the Easy Street pavement performance equations.

The 2018 predicted PCI was compared to the 2018 QC survey PCI and is shown in Figure 12. In general, the 2018 predicted PCI was higher than the PCI determined from the QC survey (larger portion of the data is below the line of equality [black solid line]). This could be associated with the difference in identified distress (count) as noted in Table 25. In addition, as indicated by the low R-squared value, the regression model (dashed blue line) does not fully explain the variability of the data around the mean. Generally, an R-squared of 0.70 or better is considered acceptable for this purpose.

Figures 13 and 14 isolate the analysis shown in Figure 12, and are based on IMS 2013 and 2015 pavement condition survey results, respectively. Figure 13 represents the predicted PCI using the 2013 IMS survey data versus the 2018 QC survey PCI. Similarly, Figure 14 shows the comparison of the predicted PCI from the IMS 2015 survey data versus the 2018 QC survey PCI. Interestingly, the R-squared for the 2015 IMS survey results indicates less variability from the mean as compared to the 2013 predicted results (R-squared for 2015 data is higher than R-squared for the 2013 data). Potential reasons for this difference could be the number of samples from the 2013 IMS survey are less than those for the 2015 survey and/or advancements in data collection equipment and distress identification algorithms (algorithms are used to identify pavement distress from images collected during the automated pavement condition survey).

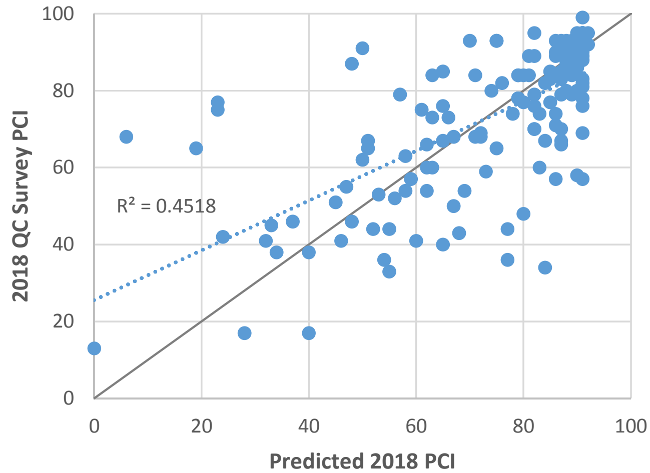


Figure 12. Predicted PCI vs. QC survey determined PCI.

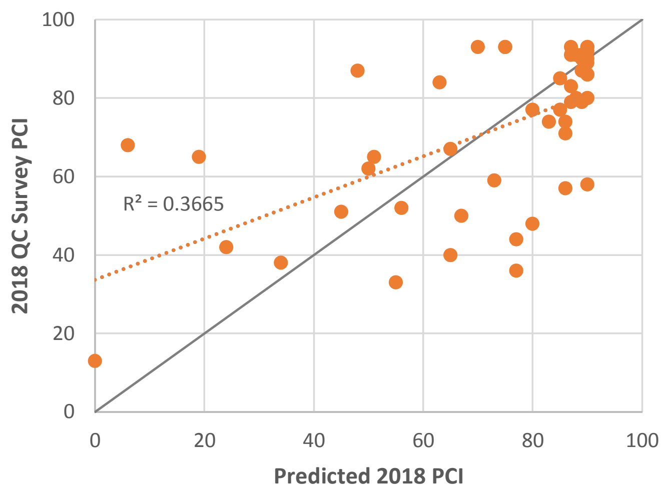


Figure 13. Predicted vs. QC survey (2013 IMS data).

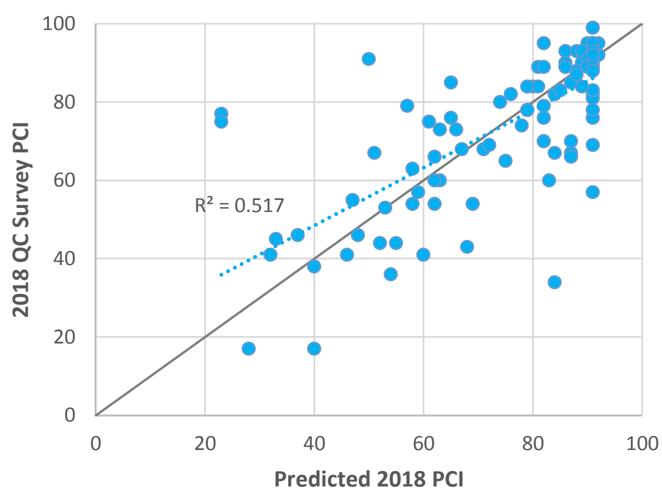


Figure 14. Predicted vs. QC survey (2015 IMS data).

Statistically, R-squared alone may not fully characterize the relationship between the IMS and QC PCI results. As part of the data quality process, quality control and acceptance results are often evaluated using the F- and t-test and the paired t-test. General assumptions for the statistical analysis methods include:

1. **Random sampling** – as described previously, the pavement segments to be included in the QC survey were based on a stratified-random sampling technique. The stratification included separating pavement segments by functional class and condition category, and verifying sufficient representative samples were selected by pavement type.
2. **Data obtained from the same location** – the ASTM D6433 survey is typically conducted on a sample of the pavement segment to be surveyed. However, since Easy Street does not contain detailed pavement condition survey results by shorter segment lengths (e.g., 0.10-mile is standard), NCE conducted the QC survey over the entire length of the pavement segment (i.e., the same segment begin and end points shown in Easy Street were used to locate segments for the QC survey).
3. **Use the same testing procedures** – both the IMS survey and the QC survey were conducted in accordance with ASTM D6433.

The F- and t-test can be used to determine whether two data sets come from the same population. The F-test compares the data set variances (standard deviations), while the t-test compares the data set means. The paired t-test is used to determine whether the means of two data sets are likely the same.

Using the results of the IMS and QC surveys, Microsoft Excel was used to calculate both the F- and t-test and the paired t-test based on the entire QC data set (no segments were excluded based on IMS survey year). The results of the F- and t-tests are shown in Tables 27 and 28, respectively, and the results of the paired t-test is shown in Table 29.

Table 27. F-test Results

Statistic	2018 Predicted PCI	2018 QC PCI
Mean	74.11	73.46
Variance	398.34	369.07
Observations	153	153
Degrees of freedom	152	152
F statistic	1.08	
P(F ≤ f) one-tail	0.32	
F Critical one-tail	1.31	

Findings

Based on the results of the statistical analysis, the two survey methods generally provided reasonably similar PCI values:

- F-test: no reason to assume the two data sets have different standard deviations.
- t-test: no reason to assume the sample means were not equal, and it's reasonable to assume that data sets came from the same population.
- Paired t-test: means of the two data sets were likely the same.

Table 28. t-test Results

Statistic	2018 Predicted PCI	2018 QC PCI
Mean	74.11	73.46
Variance	398.34	369.07
Observations	153	153
Pooled Variance	383.70	
Hypothesized mean difference	0.00	
Degrees of freedom	304	
t statistic	0.29	
P (T ≤ t) one-tail	0.39	
t Critical one-tail	1.65	
P(T ≤ t) two-tail	0.77	
t Critical two-tail	1.97	

Table 29. Paired t-test Results

Statistic	2018 Predicted PCI	2018 QC PCI
Mean	74.11	73.46
Variance	398.34	369.07
Observations	153	153
Pearson Correlation	0.67	
Hypothesized mean difference	0	
Degrees of freedom	152	
t statistic	0.50	
P (T ≤ t) one-tail	0.31	
t Critical one-tail	1.65	
P(T ≤ t) two-tail	0.61	
t Critical two-tail	1.98	

Recommendations

The comparison conducted as part of this task indicated the asphalt pavement performance models (Easy Street curves 4 and 5) appear to predict reasonable pavement condition as compared to the PCI results determined from the 2018 QC survey. The comparison of the occurrence (or count) of distress types between the IMS and QC survey is less than ideal (see Table 25); however, the analysis of the predicted versus QC-determined PCI implies the IMS survey is comparable to the field-measured QC survey. The ASTM D6433 PCI calculation weighs the severity of each distress type as a function of impact to maintenance and rehabilitation requirements. For example, potholes have a higher PCI deduct value than alligator cracking, which has a higher PCI deduct value than edge cracking. While the number of distress occurrences appears to vary, the resulting PCI values appear to reflect field conditions.

To verify both data quality and performance prediction models, the following is recommended:

- Conduct data quality control and acceptance requirements as part of each pavement condition survey.

  - Quality control requirements for vehicle configuration, distance measuring equipment, profile and distress measurement equipment, and data delivery.
  - Acceptance requirements may include, for example, conducting manual surveys (or review images from automated surveys) on a sample of the pavement network and comparing results with IMS survey results, confirming data completeness and expected range of distress values, and comparing to previous survey results.
- Request IMS to provide the details of all pavement condition surveys within Easy Street. This data should be arranged by segment, survey year, distress type, severity, and extent, along with PCI deduct values for each distress, and the calculated PCI value.
- Confirm Easy Street pavement performance prediction models reflect in-service pavements. Once the IMS data is available, performance prediction models, independent of Easy Street, could be developed and the predicted performance compared to Easy Street predicted performance. This would help determine if the remaining Easy Street performance prediction models are under or over predicting the performance of the City's road network.

SUMMARY OF RECOMMENDATIONS

This project included the review and assessment of the City's pavement management process. A total of 11 tasks were conducted to review the City's program as a whole. In general, the City's current procedures meet the primary components (and processes) of a pavement management system. However, the findings of this review indicated a number of areas where additional refinements or activities are needed. The following provides a list of recommendations by project task.

Task 1. Kick-Off Meeting (Recommendations Not Applicable)

Task 2. Records Review

- Confirm the accuracy of the Easy Street performance prediction models.
- Increase the frequency of the pavement condition survey.
- Develop a data quality management plan that includes, at a minimum, data quality control procedures (vendor) and acceptance (agency) criteria.
- Continue to utilize automated pavement condition survey methods.
- Consider incorporating pavement preservation into the City's work activities.

Task 3. Easy Street Functionality

- Obtain IMS Easy Street user manual.
- Consider removing RI from the PCI calculations to be in accordance with ASTM D6433 or request IMS revise to indicate that the PCI is a combined index.
- Assess and revise the PCI and Priority Factor (PF) calculations to remove circular or double referencing.
- Revise the priority ranking method to allow projects of the same priority/rank to be selected separately in a given budget year.
- Discuss with IMS the possibility of developing an improved, macro-enabled "front-end" user interface for navigating through Easy Street.

Task 4. Define Network Targets

- It is recommended that the City maintain its current pavement condition target values. However, the City's current funding levels cannot support its current pavement condition target values.
- Long-term, consider increasing overall pavement condition target to a PCI greater than 70.

Task 5. Maintenance and Rehabilitation Strategies

- Increase treatment costs to reflect recent contract bid awards and inclusive costs as shown in Table 13.

Task 6. Budget Analysis

- Consider dedicating a portion of the annual budget to preventive maintenance to preserve streets already in good condition.
- Pursue additional funding sources to ensure target-driven scenarios are feasible.
- Consider using decision-support tools that include:
    - Optimizing annual budget percent dedicated to preventive maintenance on a yearly basis, and
    - Allowing target values to be selected based on functional class for network-wide analyses.

- Request IMS to update Easy Street to allow for longer (e.g., 20 years) analysis periods and inclusion of pavement condition targets by functional class.

Task 7. Tools and Training

- Request IMS to populate Easy Street with the detailed results of all pavement condition surveys, including the survey year, and severity and extent of each distress type.
- Request IMS to populate Easy Street with a work history of the road network, including construction year, layer or treatment type, and thickness.
- Develop a "desk manual" that documents, for example, the process of evaluating the information received from IMS, step-by-step procedures for conducting any needed analyses, and information included in reports to upper management and the City Council.
- In the event the City determines that the recommended functionality modifications to Easy Street are cost prohibitive, and the inclusion of stop-cap costs, GIS integration, standard or customizable reports, and GASB reporting is important, consider evaluation of other pavement management systems.

Task 8. Public Outreach

- Develop a public outreach program/schedule that promotes and develops the City's pavement management program. Public outreach should include, at a minimum, the following tasks:
    - City Council Workshops.
    - City Council Presentations.
    - Develop Social Media Content.
    - Conduct Town Hall Meetings.

Task 9. Implementation Activities

The following summarizes implementation activities that have not been recommended in the above list:

- Determine importance of including stop-gap cost analysis, GIS integration, and customizable reports and graphs in the pavement management systems.
- Develop standard and customizable reporting requirements.
- Verify and update roadway widths to improve the accuracy of maintenance and rehabilitation costs estimates.
- As technology advances and is verified, consider requiring 3D data analysis as part of the pavement condition data survey contract.
- Provide staff training on:
    - Data quality management plans.
    - Easy Street operation and functionality.
    - Pavement performance prediction modeling.
    - Budgetary analysis.
    - Treatment type selection, timing, performance, and cost.

Task 11. Pavement Condition Survey Quality Control

- Conduct data quality control and acceptance requirements as part of each pavement condition survey.

- Request IMS to provide the details of all pavement condition surveys within Easy Street. This data should be arranged by segment, survey year, distress type, severity, and extent, along with PCI deduct values for each distress, and the calculated PCI value.
- Confirm Easy Street pavement performance prediction models reflect in-service pavements.

Appendix A

SCENARIO 1: BUDGET-DRIVEN ANALYSIS, $5M ANNUAL BUDGET

City of Spokane Valley, WA
Street Inventory and Five Year Rehabilitation Plan By Year

IMS
Early Street Analysis

Current PCI Date 1/1/2010
Analysis Start Date 1/1/2010

$500k/Year Rehabilitation Plan

[illegible]	Agency ID	Street Number	Block Number	Street Prefix	On Street	From Street	To Street	FunCL Code	PaveType Code	Pavement Width (ft)	Pavement Length (ft)	Add Area (yd2)	Pavement Area (yd2)	Pavement Condition Index (PCI)	Current Assigned PCI (CAPCI)	Zone	Zone Code	Project ID	Project Length (ft)	Project Current PCI	Year of First Rehab	Segment Rehab Status	Rehab Activity Code	Rehab Activity	Avg Unit Rate ($/yd2)	Peripheral Concrete Costs ($)	Segment Pavement Cost ($)	Segment Total Cost ($)	Whole Project Cost ($)	5 Year Post Rehab PCI
12690	675	6490	10		Bessie Rd	SCUT - BKD	Harrington Av	4	1	21.0	121	14	296	52	40	Zone 2	20	13240	162	40	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	26.00	0	7,698	7,698	10,586	88
12870	675	6490	20		Bessie Rd	Harrington Av	Main Av	4	1	21.0	41	5	100	52	43	Zone 2	20	13240	162	40	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	26.00	0	2,600	2,600	10,586	88
10170	227	10090	10		Sullivan Rd	SCUT - BKD	CITY BOUNDARY	1	1	46	34	9	179	48	30	Zone 2	20	20590	1300	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	7162	7160	203640	85
12150	182	4990	460		8th Av	St Charles St	Sullivan Rd	2	1	30.0	806	140	3,111	51	42	Zone 3	30	2010	806	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	124,440	124,440	124,440	87
12160	182	4990	470		8th Av	Progress Rd	St Charles St	2	1	30.0	515	90	1,880	52	43	Zone 3	30	2010	515	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	79,920	79,920	79,920	87
10430	1000	7140	200		Bowdish Rd	16th Av	12th Av	2	1	20.0	1,340	200	4,277	51	42	Zone 3	30	4000	2,636	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	175,230	175,080	344,502	87
10634	1000	7140	200		Bowdish Rd	12th Av	11th Av	2	1	20.0	340	63	1,111	55	46	Zone 3	30	4000	2,636	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	44,440	44,440	344,502	87
10594	1000	7140	210		Bowdish Rd	11th Av	10th Av	2	1	20.0	286	44	934	44	35	Zone 3	30	4000	2,636	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	37,360	37,360	344,502	87
10640	1000	7140	220		Bowdish Rd	10th Av	9th Av	2	1	20.0	336	62	1,094	47	38	Zone 3	30	4000	2,636	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	43,760	43,760	344,502	87
10636	1000	7140	230		Bowdish Rd	9th Av	8th Av	2	1	20.0	331	62	1,101	51	42	Zone 3	30	4000	2,636	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	44,040	44,040	344,502	87
14550	1700	7730	10		Cameron Ct	WEST END	Sonora Dr	4	1	36.0	430	81	1,720	38	28	Zone 3	36	4360	430	28	1	Selected Yr 1	55	FWM + Thick Overlay > 3.0 - 3.3+ - Smart Path	32.00	0	55,440	55,440	55,440	88
14172	289	10180	10		Forrest Av	24th Av	McDonald Rd	2	1	40.0	216	48	1,008	77	71	Zone 3	36	5428	216	71	1	Selected Yr 1	33	Surface Treatment Chip Seal	6.20	0	6,084	6,084	6,084	80
10392	184	10610	50		University Rd	32nd Av	31st Av	2	1	36	286	106	2,267	47	38	Zone 3	36	5368	2609	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	90,680	90,680	714,290	87
10392	184	10610	60		University Rd	31st Av	30th Av	2	1	36	324	104	2,182	52	43	Zone 3	36	5368	2609	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	87,280	87,280	714,290	87
10136	184	10610	70		University Rd	30th Av	Raymond Ct	2	1	36	241	75	1,631	44	35	Zone 3	36	5368	2609	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	65,240	65,240	714,290	87
10118	184	10610	80		University Rd	Raymond Ct	29th Av	2	1	36	88	28	602	39	30	Zone 3	30	5368	2609	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	24,080	24,080	714,290	87
10127	184	10610	90		University Rd	29th Av	28th Av	2	1	36	331	107	2,240	46	37	Zone 3	36	5368	2609	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	89,600	89,600	714,290	87
10136	184	10610	100		University Rd	28th Av	27th Av	2	1	36	325	106	2,226	50	41	Zone 3	36	5368	2609	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	89,040	89,040	714,290	87
10158	184	10610	110		University Rd	27th Av	26th Av	2	1	36	331	107	2,240	52	54	Zone 3	36	5368	2609	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	89,600	89,600	714,290	87
10168	184	10610	120		University Rd	26th Av	25th Av	2	1	36	325	106	2,226	52	43	Zone 3	36	5368	2609	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	89,040	89,040	714,290	87
10183	184	10610	130		University Rd	25th Av	24th Av	2	1	36	326	106	2,233	55	46	Zone 3	36	5368	2609	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	89,320	89,320	714,290	87
13572	1441	2170	10		16th Av	Sunrise Rd	University Rd	4	1	31.0	160	26	679	59	51	Zone 4	40	10050	160	61	1	Selected Yr 1	28	Surface Treatment Chip Seal + Smart Path	7.20	0	4,889	4,889	4,889	81
11176	162	6070	220		Argonne Rd	Knox Av	Montgomery Av	1	1	76.0	890	270	6,833	32	26	Zone 4	40	12790	890	26	1	Selected Yr 1	55	FWM + Thick Overlay > 3.0 - 3.3+ - Smart Path	30.00	0	262,990	205,000	292,952	86
12236	1900	6240	180		Barker Rd	Broadway Av	Broadway Av	2	1	40.0	216	48	1,008	56	53	Zone 4	40	13046	364	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	43,320	43,320	235,562	86
12196	1900	6240	200		Barker Rd	Broadway Av	I-90 EB OFF Ramp	2	1	40.0	100	30	130	56	53	Zone 4	40	13046	364	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	20,520	20,520	235,562	87
12197	1900	6240	210		Barker Rd	I-90 EB OFF Ramp	I-90 Fy	2	1	30.0	276	52	1,042	47	40	Zone 4	40	13046	364	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	41,680	41,680	235,562	87
12890	1900	6240	220		Barker Rd	I-90 Fy	I-90 Fy	2	1	20.0	160	28	541	30	37	Zone 4	40	13046	364	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	21,640	21,640	235,562	87
12870	1900	6240	230		Barker Rd	I-90 Fy	Cataldo Av	2	1	38.0	271	123	2,560	39	35	Zone 4	40	13046	364	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	102,400	102,400	235,562	87
16011	11	6120	10		Euclid Av	Barker Rd	Harvard St	2	1	26.0	778	100	2,269	45	41	Zone 4	40	16075	778	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	90,760	90,760	90,760	87
12397	231	10080	270		Evergreen Rd	Sprague Av	Riverside Av	1	1	30.0	311	172	3,619	37	38	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	144,760	144,760	1,523,448	86
12798	231	10080	280		Evergreen Rd	Riverside Av	Main Av	1	1	70.0	291	116	2,424	53	46	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	96,960	96,960	1,523,448	86
12890	231	10080	290		Evergreen Rd	Main Av	Nixon Av	1	1	70.0	286	131	2,746	48	44	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	109,840	109,840	1,523,448	86
12057	231	10080	300		Evergreen Rd	Nixon Av	Valleyway Av	1	1	70.0	176	68	1,430	40	35	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	57,200	57,200	1,523,448	86
12906	231	10080	310		Evergreen Rd	Valleyway Av	Valleyway Av	1	1	70.0	142	55	1,159	44	40	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	46,360	46,360	1,523,448	86
12572	231	10080	320		Evergreen Rd	Valleyway Av	Springfield Av	1	1	70.0	846	329	6,899	42	36	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	275,960	275,960	1,523,448	86
12410	231	10080	330		Evergreen Rd	Springfield Av	Broadway Av	1	1	70.0	340	132	2,774	27	24	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	110,960	110,960	1,523,448	86
12126	231	10080	340		Evergreen Rd	Broadway Av	Mallon Av	1	1	70.0	326	127	2,676	38	34	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	107,040	107,040	1,523,448	86
16814	231	10080	350		Evergreen Rd	Mallon Av	Cataldo Av	1	1	70.0	336	130	2,737	46	41	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	109,480	109,480	1,523,448	86
12331	231	10080	360		Evergreen Rd	Cataldo Av	Desmet Av	1	1	70.0	336	130	2,735	59	53	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	109,400	109,400	1,523,448	86
12161	231	10080	370		Evergreen Rd	Desmet Av	Boone Av	1	1	70.0	330	128	2,719	51	46	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	108,820	108,820	1,523,448	86
16111	231	10080	380		Evergreen Rd	Boone Av	Sharp Av	1	1	70.0	312	121	2,620	49	46	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	104,800	104,800	1,523,448	86
16136	231	10080	390		Evergreen Rd	Sharp Av	Mission Connection Av	1	1	70.0	391	154	3,244	51	47	Zone 4	40	16710	4,690	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	0	129,760	129,760	1,523,448	86
12852	1968	10610	90		Park Rd	Mission Av	Nora Av	2	1	36	562	96	2,007	48	42	Zone 4	40	16910	1886	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	80,280	80,280	322640	87
11950	1968	10610	100		Park Rd	Nora Av	Baldwin Av	2	1	36	475	68	1,454	38	30	Zone 4	40	16910	1886	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	58,160	58,160	322640	87
11871	1968	10610	110		Park Rd	Baldwin Av	Indiana Av	2	1	47	181	47	990	38	33	Zone 4	40	16910	1886	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	39,600	39,600	322640	87
16306	1968	10610	120		Park Rd	Indiana Av	Trent Av	2	1	47	564	173	3,640	38	35	Zone 4	40	16910	1886	41	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	145,600	145,600	322640	87
10173	227	10090	20		Sullivan Rd	CITY BOUNDARY	27th Av	1	1	46	471	116	2,470	39	45	Zone 4	40	20590	1300	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	98,800	98,800	203640	86
10196	227	10090	30		Sullivan Rd	27th Av	26th Ct	1	1	46	326	82	1,720	40	35	Zone 4	40	20590	1300	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	68,800	68,800	203640	86
10216	227	10090	40		Sullivan Rd	26th Ct	24th Av	1	1	46	316	128	2,719	43	39	Zone 4	40	20590	1300	42	1	Selected Yr 1	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	0	108,760	108,760	203640	86

City of Spokane Valley, WA
Street Inventory and Five Year Rehabilitation Plan By Year

IMS

Current PCI Date 1/1/2010
Analysis Start Date 1/1/2010

$500K/Year Rehabilitation Plan

OID	Agency ID	Street Number	Block Number	Street Prefix	On Street	From Street	To Street	FuncCL Code	PaveType Code	Pavement Width (ft)	Pavement Length (ft)	Add Area (yd2)	Pavement Area (yd2)	Pavement Condition Index (PCI)	Current Regional PCI (CRPCI)	Zone	Zone Code	Project ID	Project Length (ft)	Project Current PCI	Year of First Rehab	Segment Rehab Status	Rehab Activity Code	Rehab Activity	Avg Unit Rate ($/yd2)	Peripheral Concrete Costs ($)	Segment Pavement Cost ($)	Segment Total Cost ($)	Whole Project Cost ($)	5 Year Post Rehab PCI
12690	675	6490	10		Bessie Rd	SOUTH END	Harrington Av	4	1	21.0	121	14	295	52	40	Zone 2	20	13240	162	40	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	26.00	0	7,680	7,680	10,286	80
12879	675	6490	20		Bessie Rd	Harrington Av	Main Av	4	1	21.0	41	5	100	52	40	Zone 2	20	13240	162	40	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	26.00	0	2,600	2,600	10,286	80
10170	227	10660	10		Sullivan Rd	SOUTH END	CITY BOUNDARY	1	1	46	34	9	179	40	30	Zone 2	20	20590	1300	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	7160	7160	303640	85
12150	182	4990	460		8th Av	St Charles St	Sullivan Rd	2	1	30.0	800	146	3,111	51	42	Zone 3	30	2010	906	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	124,440	124,440	124,440	87
12182	182	4990	470		8th Av	Progress Rd	St Charles St	2	1	30.0	216	96	1,980	52	43	Zone 3	30	2010	516	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	79,200	79,200	79,200	87
10430	1800	7140	200		Bowdish Rd	16th Av	12th Av	2	1	20.0	1,340	298	4,377	51	42	Zone 3	30	4003	2,636	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	175,080	175,080	344,962	87
10634	1800	7140	200		Bowdish Rd	12th Av	11th Av	2	1	20.0	340	63	1,111	56	46	Zone 3	30	4003	2,636	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	44,440	44,440	344,962	87
10694	1800	7140	210		Bowdish Rd	11th Av	10th Av	2	1	20.0	298	44	934	44	36	Zone 3	30	4003	2,636	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	37,360	37,360	344,962	87
10640	1800	7140	220		Bowdish Rd	10th Av	9th Av	2	1	20.0	335	63	1,094	47	33	Zone 3	30	4003	2,636	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	43,760	43,760	344,962	87
10690	1800	7140	220		Bowdish Rd	9th Av	8th Av	2	1	20.0	331	63	1,101	51	42	Zone 3	30	4003	2,636	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	44,040	44,040	344,962	87
14850	1700	7730	10		Cameron Ct	WEST END	Sonora Dr	4	1	34.0	400	81	1,706	39	35	Zone 3	30	4363	400	26	1	Selected Yr 1	55	PMM + Thick Overlay (> 2.0 - 3.0) + Spot Patch	32.00	0	55,446	55,446	55,446	88
14173	280	10180	10		Forrest Av	28th Av	McDonald Rd	2	1	40.0	216	48	1,008	77	71	Zone 3	30	5428	216	71	1	Selected Yr 1	23	Surface Treat.: Chip Seal	6.00	0	6,048	6,048	6,048	90
10392	184	10610	50		University Rd	32nd Av	31st Av	2	1	50	336	100	2,267	47	33	Zone 3	30	5368	2609	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	90,680	90,680	714,290	87
10082	184	10610	60		University Rd	31st Av	30th Av	2	1	50	326	104	2,192	52	43	Zone 3	30	5368	2609	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	87,680	87,680	714,290	87
10108	184	10610	70		University Rd	30th Av	Raymond Ct	2	1	50	241	75	1,631	44	35	Zone 3	30	5368	2609	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	65,240	65,240	714,290	87
10119	184	10610	80		University Rd	Raymond Ct	29th Av	2	1	50	88	28	602	39	33	Zone 3	30	5368	2609	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	24,080	24,080	714,290	87
10127	184	10610	90		University Rd	29th Av	28th Av	2	1	50	331	107	2,240	46	37	Zone 3	30	5368	2609	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	89,600	89,600	714,290	87
10136	184	10610	100		University Rd	28th Av	27th Av	2	1	50	326	106	2,226	50	41	Zone 3	30	5368	2609	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	89,040	89,040	714,290	87
10150	184	10610	110		University Rd	27th Av	26th Av	2	1	50	331	107	2,240	52	54	Zone 3	30	5368	2609	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	89,600	89,600	714,290	87
10160	184	10610	120		University Rd	26th Av	25th Av	2	1	50	326	106	2,226	52	43	Zone 3	30	5368	2609	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	89,040	89,040	714,290	87
10183	184	10610	130		University Rd	25th Av	24th Av	2	1	50	330	106	2,233	56	46	Zone 3	30	5368	2609	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	89,320	89,320	714,290	87
13573	1441	2170	10		16th Av	Sunrise Rd	University Rd	4	1	31.0	160	28	679	69	61	Zone 4	40	10050	160	61	1	Selected Yr 1	23	Surface Treat.: Chip Seal + Spot Patch	7.20	0	4,889	4,889	4,889	81
11176	182	6070	220		Argonne Rd	Knox Av	Montgomery Av	1	1	76.0	880	270	6,683	32	26	Zone 4	40	12790	880	26	1	Selected Yr 1	55	PMM + Thick Overlay (> 2.0 - 3.0) + Spot Patch	30.00	0	292,890	292,890	292,890	86
12036	1800	6240	180		Barker Rd	Broadway Av	Broadway Av	2	1	40.0	216	48	1,008	56	53	Zone 4	40	15046	1,354	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	43,320	43,320	235,962	87
12196	1800	6240	200		Barker Rd	Broadway Av	I-90 EB OFF Ramp	2	1	40.0	106	36	738	56	53	Zone 4	40	15046	1,354	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	29,520	29,520	235,962	87
12197	1800	6240	210		Barker Rd	I-90 EB OFF Ramp	I-90 Fy	2	1	30.0	276	62	1,042	47	48	Zone 4	40	15046	1,354	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	41,680	41,680	235,962	87
12890	1800	6240	220		Barker Rd	I-90 Fy	I-90 Fy	2	1	29.0	160	28	541	30	37	Zone 4	40	15046	1,354	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	21,640	21,640	235,962	87
12879	1800	6240	220		Barker Rd	I-90 Fy	Cataldo Av	2	1	38.0	571	123	2,560	39	33	Zone 4	40	15046	1,354	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	102,400	102,400	235,962	87
16011	11	6120	10		Euclid Av	Barker Rd	Harvard St	2	1	26.0	776	106	2,269	45	41	Zone 4	40	16075	776	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	90,760	90,760	90,760	87
12387	231	10040	270		Evergreen Rd	Sprague Av	Riverside Av	1	1	50.0	511	173	3,619	37	30	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	144,760	144,760	1,623,480	86
12798	231	10040	280		Evergreen Rd	Riverside Av	Main Av	1	1	70.0	291	116	2,434	50	40	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	97,360	97,360	1,623,480	86
12890	231	10040	290		Evergreen Rd	Main Av	Mission Av	1	1	70.0	336	131	2,746	48	44	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	109,840	109,840	1,623,480	86
12357	231	10040	300		Evergreen Rd	Mission Av	Valleyway Av	1	1	70.0	176	60	1,438	40	35	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	57,520	57,520	1,623,480	86
12806	231	10040	310		Evergreen Rd	Valleyway Av	Valleyway Av	1	1	70.0	140	60	1,158	44	40	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	46,320	46,320	1,623,480	86
12573	231	10040	320		Evergreen Rd	Valleyway Av	Springfield Av	1	1	70.0	548	326	5,399	42	38	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	215,960	215,960	1,623,480	86
15410	231	10040	330		Evergreen Rd	Springfield Av	Broadway Av	1	1	70.0	346	132	2,774	27	24	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	110,960	110,960	1,623,480	86
12128	231	10040	340		Evergreen Rd	Broadway Av	Mallon Av	1	1	70.0	320	127	2,675	38	34	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	107,000	107,000	1,623,480	86
16814	231	10040	350		Evergreen Rd	Mallon Av	Cataldo Av	1	1	70.0	336	130	2,737	46	41	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	109,480	109,480	1,623,480	86
12301	231	10040	360		Evergreen Rd	Cataldo Av	Desmet Av	1	1	70.0	336	130	2,735	59	55	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	109,400	109,400	1,623,480	86
12161	231	10040	370		Evergreen Rd	Desmet Av	Boone Av	1	1	70.0	335	128	2,713	51	46	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	108,520	108,520	1,623,480	86
16111	231	10040	380		Evergreen Rd	Boone Av	Sharp Av	1	1	70.0	313	121	2,555	49	46	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	102,200	102,200	1,623,480	86
16136	231	10040	390		Evergreen Rd	Sharp Av	Mission Connector Av	1	1	70.0	391	154	3,244	51	47	Zone 4	40	16710	4,690	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40.00	0	129,760	129,760	1,623,480	86
12952	1968	10610	90		Park Rd	Mission Av	Nora Av	2	1	36	592	96	2,007	46	42	Zone 4	40	16910	1998	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	80,280	80,280	322,640	87
11950	1968	10610	100		Park Rd	Nora Av	Baldwin Av	2	1	36	475	68	1,454	58	50	Zone 4	40	16910	1998	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	58,160	58,160	322,640	87
11871	1968	10610	110		Park Rd	Baldwin Av	Indiana Av	2	1	47	181	47	990	58	53	Zone 4	40	16910	1998	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	39,600	39,600	322,640	87
16306	1968	10610	120		Park Rd	Indiana Av	Trent Av	2	1	47	594	173	3,640	38	35	Zone 4	40	16910	1998	41	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	145,600	145,600	322,640	87
10173	227	10660	20		Sullivan Rd	CITY BOUNDARY	27th Av	1	1	46	471	116	2,470	58	46	Zone 4	40	20590	1300	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	98,800	98,800	303,640	86
10196	227	10660	30		Sullivan Rd	27th Av	26th Ct	1	1	46	326	82	1,720	40	33	Zone 4	40	20590	1300	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	68,800	68,800	303,640	86
10216	227	10660	40		Sullivan Rd	26th Ct	24th Av	1	1	46	516	126	2,719	49	39	Zone 4	40	20590	1300	42	1	Selected Yr 1	63	PMM - Thick Overlay (> 2.0 - 3.0)	40	0	108,760	108,760	303,640	86

City of Spokane Valley, WA
Street Inventory and Five Year Rehabilitation Plan By Year

IMS
Easy Street Analysis

$500K/Year Rehabilitation Plan

Current PCI Date 1/1/2010
Analysis Start Date 1/1/2010

StrID	Agency ID	Street Number	Block Number	Street Prefix	On Street	From Street	To Street	FunCL Code	PaveType Code	Pavement Width (ft)	Pavement Length (ft)	Add Area (yd2)	Pavement Area (yd2)	Pavement Condition Index (PCI)	Current Assigned PCI (CAPCI)	Zone	Zone Code	Project ID	Project Length (ft)	Project Current PCI	Year of First Rehab	Segment Rehab Status	Rehab Activity Code	Rehab Activity	Avg Unit Rate ($/yd2)	Peripheral Concrete Costs ($)	Segment Pavement Cost ($)	Segment Total Cost ($)	Whole Project Cost ($)	5 Year Post Rehab PCI
10720	226	10080	170		Sullivan Rd	8th Av	Century Dr	1	1	57	390	120	2,626	28	26	Zone 4	48	20580	1284	26	1	Selected Yr 1	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	125023	125800	426800	96
10778	226	10080	180		Sullivan Rd	Century Dr	4th Av	1	1	54	854	286	6,010	28	26	Zone 4	48	20580	1284	26	1	Selected Yr 1	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	300623	300500	426800	96
10888	229	10080	190		Sullivan Rd	4th Av	2nd Av	1	1	58	416	136	2,832	30	26	Zone 4	48	20570	1309	26	1	Selected Yr 1	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	141623	141800	473350	96
10896	229	10080	200		Sullivan Rd	2nd Av	Sprague Av	1	1	52	816	316	6,616	28	26	Zone 4	48	20570	1309	26	1	Selected Yr 1	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	330753	330750	473350	96
11147	8380	14180	10	N	Moore Ln	Industrial Park A St	NORTH END	4	1	39	168	38	153	28	26	Zone 4	48	23580	185	26	1	Selected Yr 1	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	32.6	0	24473	24473	24473	96
10218	1080	4880	210		8th Av	Pines Rd	Houk Rd	2	1	27.0	541	87	2,038	48	33	Zone 3	30	2918	1343	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40.00	0	81,520	81,520	189,243	90
10219	1080	4880	220		8th Av	Houk Rd	Houk Rd	2	1	27.0	213	30	669	79	74	Zone 3	30	2918	1343	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40.00	0	26,720	26,720	189,243	90
10213	1080	4880	230		8th Av	Houk Rd	Collins Rd	2	1	27.0	130	22	419	80	76	Zone 3	38	2918	1343	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40.00	0	16,760	16,760	189,243	90
10206	1080	4880	240		8th Av	Collins Rd	Vercler Rd	2	1	27.0	201	30	633	41	30	Zone 3	38	2918	1343	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40.00	0	25,320	25,320	189,243	90
10207	1080	4880	250		8th Av	Vercler Rd	Vercler Rd	2	1	27.0	150	23	473	41	32	Zone 3	38	2918	1343	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40.00	0	18,920	18,920	189,243	90
10231	1481	10640	10		Gate Park Ct	SOUTH END	23rd Av	4	1	36.0	68	22	523	28	46	Zone 3	38	5468	80	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	26.00	0	13,598	13,598	13,598	90
12086	1870	15410	20		Park Rd	Broadway Av	Cataldo Av	2	1	38	584	140	2,844	28	44	Zone 3	38	7168	1221	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	117763	117760	216520	90
12116	1870	15410	30		Park Rd	Cataldo Av	I 90 Fy	2	1	38	357	116	2,469	38	49	Zone 3	38	7168	1221	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	98760	98760	216520	90
12090	136	10580	10		Thierman Rd	Sprague Av	Riverside Av	2	1	32	481	88	1,786	51	43	Zone 3	38	8208	1684	44	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	71840	71840	281350	90
12820	136	10580	20		Thierman Rd	Riverside Av	Main Av	2	1	32	358	64	1,340	49	40	Zone 3	38	8208	1684	44	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	52800	53600	281350	90
12891	136	10580	30		Thierman Rd	Main Av	[illegible] Av	2	1	32	286	51	1,079	48	36	Zone 3	38	8208	1684	44	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	43160	43160	281350	90
14904	136	10580	40		Thierman Rd	[illegible] Av	[illegible] Av	2	1	32	768	134	2,819	28	50	Zone 3	38	8208	1684	44	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	112753	112760	281350	90
12477	6780	6570	70	N	Argonne Rd	Valleyway Av	Alki Av	1	1	32.0	858	116	2,448	47	43	Zone 4	48	13730	1316	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40.00	0	97,840	97,840	196,563	90
12343	6780	6570	80	N	Argonne Rd	Alki Av	Broadway Av	1	1	32.0	861	116	2,468	51	47	Zone 4	48	13730	1316	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40.00	0	98,720	98,720	196,563	90
12086	37	7380	40		Broadway Av	Yardley St	Stanley St	1	1	46.0	858	168	3,834	38	32	Zone 4	48	13820	658	35	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50.00	0	176,700	176,700	176,702	90
12801	36	7380	80		Broadway Av	Carnahan Rd	Yardley St	2	1	46.0	858	168	3,839	48	44	Zone 4	48	13850	658	44	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40.00	0	141,560	141,560	141,563	90
12681	37	7380	90		Broadway Av	Havana St	Fancher Rd	1	1	55.0	858	286	4,522	34	33	Zone 4	48	13850	658	35	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50.00	0	210,100	210,100	210,102	90
11287	245	10670	30		Flora Rd	Euclid Av	Dalton Av	2	1	34.0	208	38	827	28	95	Zone 4	40	16210	1823	46	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	45.00	0	37,218	37,218	758,793	90
11276	245	10670	40		Flora Rd	Dalton Av	Trent Av	2	1	37.0	2,715	784	16,308	47	43	Zone 4	48	16210	1823	46	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	45.00	0	721,575	721,575	758,793	90
16331	1304	12130	50		Indiana Av	Evergreen Rd	I 90 EB ON Ramp	2	1	27.0	4,546	800	14,921	48	46	Zone 4	48	16890	4546	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40.00	0	672,840	672,840	672,843	90
12814	28	14680	50		Mission Av	Argonne Rd	Mullan Rd	2	1	48	311	74	1,662	48	43	Zone 4	48	16230	3094	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	62480	62480	690840	90
12808	28	14680	70		Mission Av	Mullan Rd	Willow Rd	2	1	48	582	134	2,823	44	43	Zone 4	48	16230	3094	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	112923	112920	690840	90
12807	28	14680	80		Mission Av	Willow Rd	Locust Rd	2	1	40	482	100	2,108	38	53	Zone 4	48	16230	3094	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	84320	84320	690840	90
12804	28	14680	90		Mission Av	Locust Rd	Farr Rd	2	1	40	814	181	3,787	48	36	Zone 4	48	16230	3094	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	161083	161080	690840	90
11896	28	14680	100		Mission Av	Farr Rd	Woodruff Rd	2	1	37	508	104	2,186	49	45	Zone 4	48	16230	3094	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	87440	87440	690840	90
11899	28	14680	110		Mission Av	Woodruff Rd	Herald Rd	2	1	42	808	156	3,576	28	53	Zone 4	48	16230	3094	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	131023	131000	690840	90
10346	226	10080	50		Sullivan Rd	28th Av	23rd Av	1	1	58	808	192	4,631	42	33	Zone 4	48	20540	2688	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	161283	161280	846750	90
10277	226	10080	60		Sullivan Rd	23rd Av	22nd Av	1	1	58	314	119	2,481	54	53	Zone 4	48	20540	2688	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	96840	96840	846750	90
10308	226	10080	70		Sullivan Rd	22nd Av	20th Av	1	1	58	391	146	3,104	58	62	Zone 4	48	20540	2688	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	124163	124160	846750	90
10336	226	10080	80		Sullivan Rd	20th Av	19th Ln	1	1	58	858	249	6,219	55	51	Zone 4	48	20540	2688	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	288753	288750	846750	90
10416	226	10080	90		Sullivan Rd	19th Ln	16th Av	1	1	58	791	301	6,234	47	43	Zone 4	48	20540	2688	46	2	Selected Yr 2	53	PWM - Thick Overlay (> 2.0 - 3.0)	40	0	252903	252900	846750	90
10476	226	10080	100		Sullivan Rd	16th Av	14th Av	1	1	52	516	149	3,126	39	35	Zone 4	48	20550	2683	31	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	159503	159500	784300	90
10528	226	10080	110		Sullivan Rd	14th Av	14th Av	1	1	46	144	38	159	34	33	Zone 4	48	20550	2683	31	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	37500	37500	784300	90
10530	226	10080	120		Sullivan Rd	14th Av	13th Av	1	1	46	168	38	621	40	33	Zone 4	48	20550	2683	31	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	41250	41250	784300	90
10552	226	10080	130		Sullivan Rd	13th Av	12th Av	1	1	46	516	128	3,103	39	35	Zone 4	48	20550	2683	31	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	135153	135150	784300	90
10584	226	10080	140		Sullivan Rd	12th Av	11th Av	1	1	46	288	72	1,516	39	36	Zone 4	48	20550	2683	31	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	75800	75800	784300	90
10626	226	10080	150		Sullivan Rd	11th Av	9th Av	1	1	54	516	156	3,248	29	23	Zone 4	48	20550	2683	31	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	162423	162420	784300	90
10688	226	10080	160		Sullivan Rd	9th Av	8th Av	1	1	57	528	187	3,508	29	26	Zone 4	48	20550	2683	31	2	Selected Yr 2	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	50	0	175423	175420	784300	90
10161	1054	7140	150		Bowdish Rd	27th Av	27th Av	2	1	40.0	3	1	14	76	80	Zone 1	18	13530	3	68	3	Selected Yr 3	43	SMPWM + Moderate Overlay (2.2 - 3.0)	31.00	0	434	434	434	90
10186	1317	17480	30		Sideworth Rd	28th Av	28th Av	4	1	40	2	0	9	76	65	Zone 1	10	20250	2	68	3	Selected Yr 3	33	Edge Mill + Thin Overlay (1.5 - 2.0)	17.68	0	159	159	159	87
12092	677	6480	10		[illegible] Rd	Sprague Av	NORTH END	4	1	21.0	186	16	380	6	3	Zone 2	20	10290	196	3	3	Selected Yr 3	73	ACP Full Depth Reconstruction	96.50	0	18,870	18,870	18,870	95
14896	668	7830	10		Broadway Av Extension Av	Fancher Rd	Broadway Av	4	1	32.0	416	74	1,654	42	30	Zone 2	38	13840	416	30	3	Selected Yr 3	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	32.60	0	53,930	53,930	53,930	91
11726	383	13640	10		Mansfield Av	WEST END	CITY BOUNDARY	4	1	22	38	4	77	46	33	Zone 2	38	17790	1288	33	3	Selected Yr 3	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	32.6	0	2509	2509	108250	91
11724	383	13640	20		Mansfield Av	CITY BOUNDARY	Dickey Rd	4	1	22	821	77	1,609	46	33	Zone 2	38	17790	1288	33	3	Selected Yr 3	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	32.6	0	52290	52290	108250	91
16311	383	13640	30		Mansfield Av	Dickey Rd	Barker Rd	4	1	22	848	78	1,645	46	33	Zone 2	38	17790	1288	33	3	Selected Yr 3	55	PWM + Thick Overlay (> 2.0 - 3.2) + Spot Patch	32.6	0	53460	53460	108250	91

City of Spokane Valley, WA
Street Inventory and Five Year Rehabilitation Plan By Year

IMS
Easy Street Analysis

Current PCI Date 1/1/2010
Analysis Start Date 1/1/2010

$500K/Year Rehabilitation Plan

Street ID	Agency ID	Street Number	Block Number	Street Prefix	On Street	From Street	To Street	FunCL Code	PaveType Code	Pavement Width (ft)	Pavement Length (ft)	Add Area (yd2)	Pavement Area (yd2)	Pavement Condition Index (PCI)	Current Assigned PCI (CAPCI)	Zone	Zone Code	Project ID	Project Length (ft)	Project Current PCI	Year of First Rehab	Segment Rehab Measure	Rehab Activity Code	Rehab Activity	Avg Unit Rate ($/yd2)	Peripheral Concrete Costs ($)	Segment Pavement Cost ($)	Segment Total Cost ($)	Whole Project Cost ($)	5 Year Post Rehab PCI
11408	397	19650	10		Rocke Rd	SOUTH BND	Marietta Av	4	1	36	288	52	1,054	46	33	Zone 2	28	19940	288	33	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	35558	35555	35550	91
12790	665	19130	20		Valleyway Av	Elia Rd	Dick Rd	4	1	22	561	81	1,627	50	44	Zone 2	28	21110	1309	44	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	26	3	44122	44122	89296	91
12789	665	19130	30		Valleyway Av	Dick Rd	Vista Rd	4	1	22	560	81	1,609	50	44	Zone 2	28	21110	1309	44	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	26	3	44174	44174	89296	91
12611	1561	2790	20		32nd Av	Evergreen Rd	Bolivar Rd	4	1	40.0	320	71	1,423	41	34	Zone 3	38	1908	320	34	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	48,523	48,523	46,523	91
11704	50	7390	480		Broadway Av	Sullivan Rd	Moore Rd	2	1	45.0	1,417	354	7,439	50	47	Zone 3	38	4168	1417	47	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	3	297,560	297,560	297,560	90
14330	165	9010	40		Dishman Mica Rd	Thorpe Rd	Wilbur Rd	2	1	42.0	1,872	450	9,669	50	47	Zone 3	38	5068	2734	46	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	3	386,620	386,620	635,960	90
14429	165	9010	50		Dishman Mica Rd	Hanberry Ct	Wilbur Rd	2	1	42.0	425	100	2,062	69	56	Zone 3	38	5068	2734	46	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	3	83,560	83,560	635,960	90
12790	165	9010	90		Dishman Mica Rd	Bowdish Rd	Hanberry Ct	2	1	42.0	336	78	1,642	57	46	Zone 3	38	5068	2734	46	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	3	65,680	65,680	635,960	90
16456	430	11520	40		Grace Av	Pines Rd	Cherry St	4	1	40.0	302	67	1,429	41	34	Zone 3	38	5468	302	34	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	46,763	46,763	46,763	91
16476	695	11530	10		Grace Ct	WEST END	Joel Rd	4	1	45.0	328	78	1,630	41	34	Zone 3	38	5468	328	34	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	52,976	52,976	52,976	91
14896	135	11530	10		Heacox Av	Fancher Rd	Broadway Av	2	1	32.0	1,432	256	6,046	50	47	Zone 3	38	5518	1405	41	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	3	213,840	213,840	213,840	90
12919	1979	11590	10		Harold Rd	Sprague Av	Main Av	3	1	30.0	592	111	2,221	50	47	Zone 3	38	5568	593	41	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	34.00	3	75,514	75,514	75,514	90
11636		12150	20		Indiana Av	Tschirley Rd	Tschirley Rd	4	1	20.0	100	18	327	79	75	Zone 3	30	5928	100	75	3	Selected Yr 3	33	Surface Treatment, Chip Seal	5.30	3	1,733	1,733	1,733	89
11401	699	13640	20		Marin Dr	Drummond St	Harmony Rd	4	1	40	421	94	1,685	47	33	Zone 3	38	6428	1129	33	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	60052	60069	106221	91
16497	699	13640	30		Marin Dr	Harmony Rd	McMillan Rd	4	1	40	598	133	3,211	34	27	Zone 3	38	6428	1129	33	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	104650	104069	106221	91
16438	683	14140	10		Montgomery Dr	Montgomery Dr	McMillan Rd	4	1	40	331	73	1,679	40	35	Zone 3	38	6928	696	30	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	51123	51129	106896	91
11424	683	14140	20		Montgomery Dr	McMillan Rd	Montgomery Dr	4	1	40	361	80	1,685	34	27	Zone 3	38	6928	696	30	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	54763	54769	106896	91
16456	683	14150	10		Montgomery Dr	Montgomery Dr	Marietta Av	4	1	40	512	114	2,289	41	34	Zone 3	38	6948	512	34	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	71642	71649	71649	91
12804	1973	15650	10		Park Rd	Valleyway Av	Broadway Av	2	1	36	1,317	256	6,278	44	35	Zone 3	38	7118	1317	36	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	33	3	268923	268900	268900	90
16881	185	19610	10		University Rd	Dishman Mica Rd	35th Av	2	1	57	94	20	625	74	63	Zone 3	30	8318	1194	41	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	3	25000	25003	296980	90
14357	185	19610	20		University Rd	35th Av	Raymond Ct	2	1	57	590	174	3,658	54	45	Zone 3	38	8318	1194	41	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	3	146323	146323	296980	90
16874	185	19610	30		University Rd	30th Av	32nd Av	2	1	57	470	149	3,126	50	45	Zone 3	38	8318	1194	41	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	3	125040	125040	296980	90
16791	1724	3590	10		34th Av	Glenn Rd	Gillis Rd	4	1	33.0	300	62	1,155	30	33	Zone 4	48	11490	300	33	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	37,538	37,538	37,539	91
12770	1740	3530	30		34th Av	Wilbur Rd	Loretta Dr	4	1	37.0	67	18	377	36	33	Zone 4	48	11520	67	33	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	12,353	12,353	12,353	91
14450	1728	3540	10		35th Av	University Rd	Van Marter Rd	4	1	33.0	501	60	1,630	22	33	Zone 4	48	11540	1376	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	52,735	63,725	176,593	91
14451	1728	3540	20		35th Av	Van Marter Rd	Glenn Rd	4	1	34.0	396	74	1,647	30	31	Zone 4	48	11540	1376	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	33,278	60,278	176,593	91
14452	1728	3540	30		35th Av	Glenn Rd	Gillis Rd	4	1	34.0	300	67	1,180	41	33	Zone 4	48	11540	1376	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	38,578	38,578	176,593	91
14454	1728	3540	40		35th Av	Gillis Rd	Alona Ct	4	1	34.0	198	30	734	48	48	Zone 4	48	11540	1376	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	23,966	23,966	176,593	91
14456	1740	3580	10		35th Av	Bates Rd	Fox St	4	1	36.0	825	124	3,614	30	37	Zone 4	48	11550	848	30	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	54,955	64,935	136,963	91
14464	1740	3580	20		35th Av	Fox St	Loretta Dr	4	1	34.0	328	61	1,260	39	35	Zone 4	40	11550	848	30	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	41,929	41,929	136,963	91
12793	1760	3790	30		37th Av	Bowdish Rd	Bates Rd	4	1	37.0	355	73	1,631	39	35	Zone 4	40	11610	1574	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	49,759	49,759	274,469	91
14437	1760	3790	50		37th Av	Bates Rd	Bates Dr	4	1	30.0	161	30	734	34	32	Zone 4	48	11610	1574	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	23,955	23,955	274,469	91
14438	1760	3790	70		37th Av	Bates Dr	Reeves Rd	4	1	30.0	291	64	1,262	23	21	Zone 4	48	11610	1574	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	43,340	43,340	274,469	91
14439	1760	3790	80		37th Av	Reeves Rd	38th Av	4	1	30.0	291	64	1,262	35	32	Zone 4	48	11610	1574	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	43,340	43,340	274,469	91
14440	1760	3790	90		37th Av	38th Av	Fox St	4	1	30.0	406	95	1,696	40	37	Zone 4	48	11610	1574	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	54,978	64,370	274,469	91
14453	1760	3790	100		37th Av	Fox St	Loretta Dr	4	1	30.0	326	72	1,450	41	33	Zone 4	40	11610	1574	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	48,100	48,130	274,469	91
11787	153	6370	210		Argonne Rd	Mullan Rd	Knox Av	1	1	72.0	423	196	3,601	39	35	Zone 4	48	12720	423	35	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	30.00	3	117,092	117,650	177,562	90
14897	96	7390	20		Broadway Av	CITY BOUNDARY	Carnahan Rd	2	1	45.0	2,547	677	14,207	50	45	Zone 4	48	13090	2547	46	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40.00	3	568,280	568,280	568,280	90
16496	9	10010	10		Euclid Av	Unknown	Sullivan Rd	3	1	25.0	1,373	191	4,824	37	34	Zone 4	48	16340	1373	34	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.0 + Seal Patch	42.66	3	170,175	170,175	170,175	90
14455	1763	10110	10		Fox Dr	WEST END	Fox St	4	1	51.0	307	68	1,539	39	33	Zone 4	48	16340	307	30	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	40,073	40,378	40,378	91
14140	1141	12020	10		Kenn Rd	Rocky Ridge Dr	16th Av	4	1	40.0	960	214	4,483	34	31	Zone 4	48	17140	960	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.66	3	146,222	146,020	146,333	91
16170	90	14660	160		Mission Av	University Rd	Glenn Rd	2	1	36	820	164	3,446	60	57	Zone 4	48	18280	2808	41	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	3	137840	137840	472000	90
11853	90	14660	170		Mission Av	Glenn Rd	Pierce Rd	2	1	39	510	110	2,320	50	45	Zone 4	48	18280	2808	41	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	3	92800	92800	472000	90
11850	90	14660	180		Mission Av	Pierce Rd	Woodward Rd	2	1	39	960	206	4,382	46	42	Zone 4	48	18280	2808	41	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	3	175283	175280	472000	90
11851	90	14660	190		Mission Av	Woodward Rd	Bowdish Rd	2	1	39	360	78	1,622	46	41	Zone 4	48	18280	2808	41	3	Selected Yr 3	53	FWM - Thick Overlay (> 2.0 - 3.3)	40	3	66000	66003	472000	90
16896	1937	16620	10		Rocke Rd	9th Av	8th Av	4	1	39	354	77	1,610	35	32	Zone 4	48	19810	354	32	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	52326	52325	52320	91
16397	1737	17470	10		Sipprell Rd	30th Av	32nd Av	4	1	40	196	43	910	35	33	Zone 4	48	20290	196	30	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	29575	29675	29572	91
11171	179	19620	30		University Rd	Fairview Av	Trent Av	2	1	26	388	64	1,131	39	35	Zone 4	48	21225	388	36	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	33	3	56580	56583	56582	90
16927	1367	19670	10		Willamette St	SOUTH BND	8th Av	4	1	49	511	196	3,430	35	33	Zone 4	48	21840	511	32	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	113425	113425	113425	91
11598	3180	19670	10	S	Perrine Rd	Mansfield Av	N Perrine Rd	4	1	41	284	62	1,259	34	31	Zone 4	48	22840	419	31	3	Selected Yr 3	55	FWM + Thick Overlay > 2.0 - 3.2 + Seal Patch	32.6	3	44135	44135	57480	91

City of Spokane Valley, WA
Street Inventory and Five Year Rehabilitation Plan By Year

IMS Easy Street Analysis

$500K/Year Rehabilitation Plan

Current PCI Date 1/1/2019
Analysis Start Date 1/1/2019

Street ID	Agency ID	Street Number	Block Number	Street Prefix	On Street	From Street	To Street	FuncCL Code	PaveType Code	Pavement Width (ft)	Pavement Length (ft)	Add Area (yd2)	Pavement Area (yd2)	Pavement Condition Index (PCI)	Current Assigned PCI (CAPCI)	Zone	Zone Code	Project ID	Project Length (ft)	Project Current PCI	Year of First Rehab	Segment Rehab Reason	Rehab Activity Code	Rehab Activity	Avg Unit Rate ($/yd2)	Peripheral Concrete Costs ($)	Segment Pavement Cost ($)	Segment Total Cost ($)	Whole Project Cost ($)	5 Year Post Rehab PCI
11597	8100	15670	20	N	Fernie Rd	Pennie Rd	NORTH END	4	1	26	106	20	411	36	33	Zone 4	48	22840	416	31	3	Selected Yr 3	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	32.6	0	13390	13390	67400	91
15340	96	7380	10		Broadway Av	WEST END	CITY BOUNDARY	2	1	46.0	33	9	177	64	61	Zone 2	20	13810	33	61	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40.00	0	7,080	7,080	7,080	92
12637	1917	9780	40		Dyer Rd	Broadway Av	Mallon Av	4	1	21.0	286	30	685	46	34	Zone 2	20	16230	1,693	34	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	32.66	0	22,361	22,390	133,965	92
12627	1917	9780	50		Dyer Rd	Mallon Av	Dean Av	4	1	21.0	281	30	689	46	34	Zone 2	20	16230	1,693	34	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	32.66	0	22,960	22,390	133,965	92
12456	1917	9780	60		Dyer Rd	Dean Av	Desmet Av	4	1	21.0	561	60	1,274	46	34	Zone 2	20	16230	1,693	34	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	32.66	0	44,960	44,536	133,965	92
12313	1917	9780	70		Dyer Rd	Desmet Av	Sharp Av	4	1	21.0	561	60	1,274	46	34	Zone 2	20	16230	1,693	34	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	32.66	0	44,960	44,536	133,965	92
10906	1906	10080	440		Sullivan Rd	CITY BOUNDARY	CITY BOUNDARY	1	1	20	9	0	8	37	23	Zone 2	20	20880	1306	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	400	400	266650	92
14340	167	9010	80		Dishman Mica Rd	CITY BOUNDARY	Thorpe Rd	2	1	80.0	1,476	313	6,644	39	46	Zone 3	30	4960	1,476	46	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40.00	0	261,760	261,760	261,760	92
10736	145	10650	130		Park Rd	4th Av	3rd Av	2	1	50	336	84	1,670	61	53	Zone 3	30	7160	930	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	76120	79120	217720	92
10774	145	10650	140		Park Rd	3rd Av	2nd Av	2	1	50	330	82	1,635	54	45	Zone 3	30	7160	930	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	71000	72000	217720	92
10634	145	10650	150		Park Rd	2nd Av	Appleway Bl	2	1	50	264	73	1,640	61	53	Zone 3	30	7160	930	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	61600	61600	217720	92
10636	139	10080	40		Thierman Rd	8th Av	7th Av	2	1	40	326	73	1,635	46	33	Zone 3	30	8118	1308	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	61400	61400	247800	92
10627	139	10080	50		Thierman Rd	7th Av	6th Av	2	1	40	330	73	1,640	66	57	Zone 3	30	8118	1308	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	61600	61600	247800	92
10656	139	10080	60		Thierman Rd	6th Av	5th Av	2	1	40	335	74	1,649	56	45	Zone 3	30	8118	1308	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	61960	61960	247800	92
10866	139	10080	70		Thierman Rd	5th Av	4th Av	2	1	40	331	73	1,670	67	59	Zone 3	30	8118	1308	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	62820	62820	247800	92
10331	183	10610	140		University Rd	24th Av	23rd Av	2	1	55	336	87	3,641	53	44	Zone 3	30	8368	2642	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	182050	182050	816900	92
10316	183	10610	150		University Rd	23rd Av	22nd Av	2	1	55	336	87	3,641	50	41	Zone 3	30	8368	2642	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	182050	182050	816900	92
10336	183	10610	160		University Rd	22nd Av	21st Av	2	1	55	336	87	3,641	54	46	Zone 3	30	8368	2642	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	182050	182050	816900	92
10356	183	10610	170		University Rd	21st Av	20th Av	2	1	55	331	87	3,647	46	36	Zone 3	30	8368	2642	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	182350	182350	816900	92
10300	183	10610	180		University Rd	20th Av	19th Av	2	1	55	327	86	3,622	41	32	Zone 3	30	8368	2642	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	181100	181100	816900	92
10336	183	10610	190		University Rd	19th Av	18th Av	2	1	55	344	101	3,127	46	37	Zone 3	30	8368	2642	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	186350	186350	816900	92
14094	183	10610	200		University Rd	18th Av	16th Av	2	1	55	660	191	4,019	37	26	Zone 3	30	8368	2642	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	200650	200650	816900	92
14820	97	7380	90		Broadway Av	Stanley St	Howe St	1	1	46.0	566	170	3,652	42	33	Zone 4	40	13840	664	36	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.0) + Seal/Patch	50.00	0	178,100	178,100	178,100	92
11306	1902	10010	20		Euclid Av	Sullivan Rd	Industrial Park 1st St	3	1	80.0	821	310	6,612	40	37	Zone 4	40	16550	3,311	36	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	42.66	0	278,700	278,100	1,115,301	92
16400	1902	10010	30		Euclid Av	Industrial Park 1st St	Moore Ln	3	1	80.0	1,182	450	9,459	38	30	Zone 4	40	16550	3,311	36	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	42.66	0	403,300	403,000	1,115,301	92
16477	1902	10010	40		Euclid Av	Moore Ln	Marietta Av	3	1	80.0	1,298	490	10,297	42	36	Zone 4	40	16550	3,311	36	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	42.66	0	437,823	437,623	1,115,301	92
14424	1800	14430	10		Mirty Ct	Schafer Rd	Old Schafer Rd	4	1	36	216	42	876	67	66	Zone 4	40	10180	216	66	4	Selected Yr 4	25	Surface Treatment/Chip Seal + Seal/Patch	7	0	6132	6132	6132	94
16000	169	14640	40		Mullan Rd	Broadway Av	Cataldo Av	1	1	36	570	130	2,134	47	43	Zone 4	40	16550	2646	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	135720	135720	540150	92
15391	169	14640	50		Mullan Rd	Cataldo Av	Boone Av	1	1	36	546	130	2,120	37	30	Zone 4	40	16550	2646	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	135150	135150	540150	92
15227	169	14640	60		Mullan Rd	Boone Av	Sinto Av	1	1	34	526	116	2,480	46	41	Zone 4	40	16550	2646	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	124030	124030	540150	92
16095	169	14640	70		Mullan Rd	Sinto Av	Mission Av	1	1	36	702	136	2,866	37	30	Zone 4	40	16550	2646	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	143300	143300	540150	91
11850	1906	10080	420		Sullivan Rd	Wellesley Av	East Valley School	1	1	24	426	57	1,180	44	40	Zone 4	40	20880	1306	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	59000	59000	266650	92
11820	1906	10080	430		Sullivan Rd	East Valley School	CITY BOUNDARY	1	1	36	886	196	3,667	40	36	Zone 4	40	20880	1306	31	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	50	0	183350	183350	266650	92
11880	1	19080	10		Wellesley Av	CITY BOUNDARY	McDonald Rd	2	1	36	1,230	236	4,339	34	30	Zone 4	40	21050	1058	50	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	45	0	195155	195155	195155	92
11849	5	19080	180		Wellesley Av	Sullivan Rd	Tefoe Rd	2	1	42	400	93	1,861	46	41	Zone 4	40	21590	5209	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	76440	76440	856000	92
11848	5	19080	200		Wellesley Av	Tolford Rd	Moore Rd	2	1	48	926	221	4,640	51	47	Zone 4	40	21590	5209	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	186520	186520	856000	92
11846	5	19080	210		Wellesley Av	Moore Rd	Moore Rd	2	1	42	101	36	199	47	43	Zone 4	40	21590	5209	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	39150	31160	856000	92
11844	5	19080	220		Wellesley Av	Moore Rd	Isenhart Rd	2	1	48	990	231	4,601	46	44	Zone 4	40	21590	5209	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	180040	180240	856000	92
16616	5	19080	230		Wellesley Av	Isenhart Rd	Long Rd	2	1	44	342	84	1,756	51	47	Zone 4	40	21590	5209	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	70340	70340	856000	92
11836	5	19080	240		Wellesley Av	Long Rd	Lillian Rd	2	1	44	340	83	1,745	56	53	Zone 4	40	21590	5209	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	68000	69000	856000	92
16616	5	19080	250		Wellesley Av	Lillian Rd	Conklin Rd	2	1	44	336	83	1,720	50	45	Zone 4	40	21590	5209	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	68520	69520	856000	92
11837	5	19080	260		Wellesley Av	Conklin Rd	Sunnyvale Dr	2	1	44	341	83	1,749	49	45	Zone 4	40	21590	5209	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	68800	69960	856000	92
16621	5	19080	270		Wellesley Av	Sunnyvale Dr	Flora Rd	2	1	27	1,442	316	4,643	69	65	Zone 4	40	21590	5209	50	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	181720	181720	856000	92
20842	1300	1230	10		Broadway Flora Roundabout	Flora Rd	Broadway Ave	2	1	10.0	67	5	119	98	96	Zone 4	40	22350	246	96	4	Selected Yr 4	13	Preventative Maintenance	3.20	0	357	357	1,555	90
20841	1300	1230	20		Broadway Flora Roundabout	Flora Rd	Broadway Ave	2	1	10.0	66	7	139	98	96	Zone 4	40	22350	246	96	4	Selected Yr 4	13	Preventative Maintenance	3.20	0	417	417	1,555	90
20836	1300	1230	30		Broadway Flora Roundabout	Broadway Ave	Flora Rd	2	1	10.0	67	5	120	95	93	Zone 4	40	22350	246	96	4	Selected Yr 4	13	Preventative Maintenance	3.20	0	360	360	1,555	90
20837	1300	1230	40		Broadway Flora Roundabout	Broadway Ave	Flora Rd	2	1	10.0	68	7	143	98	96	Zone 4	40	22350	246	96	4	Selected Yr 4	13	Preventative Maintenance	3.20	0	429	429	1,555	90
11216	2370	1990	10	N	Gemini Ln	Brains Ln	NORTH END	4	1	26.0	306	47	888	37	34	Zone 4	40	23430	306	34	4	Selected Yr 4	55	FWM + Thick Overlay (> 2.0 - 3.2) + Seal/Patch	32.66	0	32,110	32,110	32,110	92
20826	8960	6890	10		Montgomery Roundabout	Montgomery Dr	Montgomery Dr	2	1	16	106	12	204	52	49	Zone 4	40	22780	367	46	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	8162	8160	37960	92
115980	8970	6870	10		Montgomery Roundabout	Montgomery Dr	Mansfield Ave	2	1	16	128	11	238	44	40	Zone 4	40	22780	367	46	4	Selected Yr 4	53	FWM + Thick Overlay (> 2.0 - 3.0)	40	0	9520	9520	37960	92

City of Spokane Valley, WA
Street Inventory and Five Year Rehabilitation Plan By Year

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Analysis Start Date 1/1/2019

$500k/Year Rehabilitation Plan

Street ID	Agency ID	Street Number	Block Number	Street Prefix	On Street	From Street	To Street	Func'l Code	Pave Type Code	Pavement Width (ft)	Pavement Length (ft)	Add Area (yd2)	Pavement Area (yd2)	Pavement Condition Index (PCI)	Current Assigned PCI (CAPCI)	Zone	Zone Code	Project ID	Project Length (ft)	Project Current PCI	Year of First Rehab	Segment Rehab Reason	Rehab Activity Code	Rehab Activity	Avg Unit Rate ($/yd2)	Segment Concrete Costs ($)	Segment Pavement Cost ($)	Segment Total Cost ($)	Whole Project Cost ($)	5 Year Post Rehab PCI
115802	5500	6580	10		Montgomery Roundabout	Montgomery Dr	Mansfield Ave	2	1	16	106	12	242	52	56	Zone 4	40	22780	397	45	4	Selected Yr 4	53	FWM – Thick Overlay (> 2.0 - 3.3)	40	0	9583	9583	27,990	92
11934	1901	6240	250		Barker Rd	Boone Av	Boone Av	2	1	45.0	38	12	330	50	46	Zone 2	38	15250	1,522	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	6,000	9,008	300,302	94
12843	40	7390	180		Broadway Av	Lily Rd	Broadway Av	2	1	44.0	126	31	657	58	54	Zone 2	20	15890	816	53	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	23,368	26,280	187,302	94
11959	450	7590	10		Calvin Rd	Wellesley Av	Wabash Av	4	1	40.0	902	290	4,229	47	35	Zone 2	20	14110	1,200	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.68	0	138,790	136,193	182,468	94
16640	450	7590	20		Calvin Rd	Wabash Av	Olympic Av	4	1	40.0	301	67	1,405	47	35	Zone 2	20	14110	1,200	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.68	0	45,963	45,953	182,468	94
16276	384	9480	40		Dickey Rd	Knox Av	Mansfield Av	4	1	27.0	314	47	989	47	35	Zone 2	20	14870	314	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.68	0	32,143	32,143	32,143	94
10931	663	9710	10		Dyer Rd	Sprague Av	NORTH END	4	1	32.0	246	44	919	46	34	Zone 2	20	16170	246	34	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.68	0	29,956	29,956	29,935	94
15276	141	10180	10		Ella Rd	Boone Av	Sinto Av	4	1	40.0	658	146	3,071	47	36	Zone 2	20	16010	658	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.68	0	99,908	99,908	99,609	94
14690	110	1020	10		16th Av	Saltese Rd	Conklin Rd	2	1	42.0	396	140	2,030	58	49	Zone 3	30	1160	2,273	50	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	117,200	117,200	446,522	94
15490	110	1020	20		16th Av	Conklin Rd	Vercler Rd	2	1	42.0	396	73	1,646	60	51	Zone 3	30	1160	2,273	50	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	65,840	65,840	446,522	94
13448	110	1020	30		16th Av	Vercler Rd	Virginia St	2	1	42.0	314	73	1,539	60	61	Zone 3	30	1160	2,273	50	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	61,560	61,560	446,522	94
13446	110	1020	40		16th Av	Virginia St	Woodlawn Rd	2	1	42.0	346	73	1,686	58	49	Zone 3	30	1160	2,273	50	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	65,640	65,640	446,522	94
13443	110	1020	50		16th Av	Woodlawn Rd	Mamer Rd	2	1	42.0	346	73	1,686	59	55	Zone 3	30	1160	2,273	50	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	65,640	65,640	446,522	94
13442	110	1020	60		16th Av	Mamer Rd	McDonald Rd	2	1	42.0	348	81	1,681	58	47	Zone 3	30	1160	2,273	50	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	67,240	67,240	446,522	94
12609	1998	2870	10		23rd Ct	Vista Crest Dr	EAST END	4	1	48.0	106	36	755	42	35	Zone 3	30	1960	106	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.0 + Spot Patch	32.68	0	24,670	24,670	24,670	94
14490	1981	3020	10		31st Ct	Clinton Rd	EAST END	4	1	41.0	376	60	1,784	80	76	Zone 3	30	2360	376	76	5	Selected Yr 5	33	Surface Treatment, Chip Seal	5.00	0	8,867	8,867	8,867	95
14758	1964	4250	5		4th Av	CITY BOUNDARY	Dearborn Rd	2	1	52.0	652	116	3,434	72	66	Zone 3	30	2620	1,310	66	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	45.00	0	109,290	109,830	220,096	94
13197	1964	4250	10		4th Av	Dearborn Rd	Custer Rd	2	1	52.0	658	117	3,407	56	43	Zone 3	30	2620	1,310	66	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	45.00	0	110,288	110,885	220,096	94
13390	34	4840	100		8th Av	Dickey Rd	Bannen Rd	2	1	26.0	661	86	2,035	60	51	Zone 3	30	2960	1,596	52	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	83,368	83,230	242,343	94
13398	34	4840	110		8th Av	Bannen Rd	Dollar Rd	2	1	26.0	573	87	1,641	58	55	Zone 3	30	2960	1,596	52	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	61,648	61,640	242,343	94
13396	34	4840	120		8th Av	Dollar Rd	Thierman Rd	2	1	26.0	661	86	2,035	60	51	Zone 3	30	2960	1,596	52	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	83,368	83,230	242,343	94
14744	39	4850	130		8th Av	University Rd	Glenn Rd	2	1	29.0	769	129	2,605	61	64	Zone 3	30	2960	3,656	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	103,400	103,400	309,933	94
14746	39	4850	140		8th Av	Glenn Rd	Pierce Rd	2	1	20.0	564	81	1,820	58	65	Zone 3	30	2960	3,656	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	72,930	72,930	309,933	94
14748	39	4850	150		8th Av	Pierce Rd	Bowdish Rd	2	1	28.0	1,327	214	4,490	57	43	Zone 3	30	2960	3,656	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	179,600	179,600	309,933	94
10330	342	6370	10		Adams Rd	CITY BOUNDARY	24th Av	2	1	23.0	593	60	1,779	40	36	Zone 3	30	3060	600	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	50.00	0	88,950	88,950	98,600	94
12816	663	6870	10		Clinton Rd	Sprague Av	Main Av	4	1	38.0	698	140	3,640	49	35	Zone 3	30	4960	698	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.68	0	95,910	95,910	95,910	94
14432	165	9510	70		Dishman Mica Rd	42nd Av	Bowdish Rd	2	1	42.0	1,718	401	8,418	60	51	Zone 3	30	5918	1,718	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	336,720	336,720	336,720	94
10776	174	10480	50		Farr Rd	4th Av	Appleway Bl	3	1	24.0	600	80	1,680	46	37	Zone 3	30	5920	600	37	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.0 + Spot Patch	42.68	0	71,400	71,400	71,400	94
14879	1507	14610	10		Molter Rd	Saltese Rd	16th Av	4	1	40	714	158	3,332	49	36	Zone 3	30	6900	714	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.6	0	108,890	108,890	108,890	94
10942	145	10550	90		Park Rd	8th Av	8th Ln	2	1	44	366	66	1,674	76	63	Zone 3	30	7060	1284	54	5	Selected Yr 5	59	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	45	0	84,330	84,330	299,806	94
10947	145	10550	100		Park Rd	8th Ln	6th Av	2	1	44	288	68	1,376	59	54	Zone 3	30	7060	1284	54	5	Selected Yr 5	59	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	45	0	61,920	61,920	299,806	94
10676	145	10550	110		Park Rd	6th Av	5th Av	2	1	44	336	81	1,694	49	39	Zone 3	30	7060	1284	54	5	Selected Yr 5	59	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	45	0	76,230	76,230	299,806	94
10704	145	10550	120		Park Rd	5th Av	4th Av	2	1	44	391	81	1,699	62	53	Zone 3	30	7060	1284	54	5	Selected Yr 5	59	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	45	0	76,455	76,455	299,806	94
11896	1372	15610	50		Park Rd	I-90 Fy	Sharp Av	2	1	36	361	77	1,627	72	65	Zone 3	30	7110	1308	53	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40	0	65,080	65,080	244,490	94
12216	1372	15610	60		Park Rd	Sharp Av	Sinto Av	2	1	36	392	81	1,680	58	44	Zone 3	30	7110	1308	53	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40	0	67,200	67,200	244,490	94
12198	1372	15610	70		Park Rd	Sinto Av	Maxwell Av	2	1	36	211	48	892	55	55	Zone 3	30	7110	1308	53	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40	0	35,680	35,680	244,490	94
16897	1372	15610	80		Park Rd	Maxwell Av	Mission Av	2	1	36	396	82	1,726	59	46	Zone 3	30	7110	1308	53	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40	0	69,040	69,040	244,490	94
12813	1901	6240	240		Barker Rd	Cataldo Av	Boone Av	2	1	47.0	162	42	892	46	42	Zone 4	40	15250	1,522	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	35,680	35,680	300,302	94
11898	1901	6240	260		Barker Rd	Boone Av	Sharp Av	2	1	48.0	306	84	1,767	47	43	Zone 4	40	15250	1,522	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	70,680	70,680	300,302	94
11897	1901	6240	270		Barker Rd	Sharp Av	Sinto Av	2	1	48.0	331	82	1,851	59	66	Zone 4	40	15250	1,522	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	75,640	74,040	300,302	94
11878	1901	6240	280		Barker Rd	Sinto Av	Maxwell Av	2	1	44.0	336	82	1,726	58	65	Zone 4	40	15250	1,522	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	69,040	69,040	300,302	94
15340	1901	6240	290		Barker Rd	Maxwell Av	Mission Av	2	1	44.0	348	85	1,776	58	63	Zone 4	40	15250	1,522	51	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	71,040	71,040	300,302	94
14829	40	7390	200		Broadway Av	Heacox Av	Broadway Av	2	1	50.0	489	157	3,285	56	53	Zone 4	40	15890	816	53	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	131,800	131,800	187,302	94
12541	40	7390	10		Broadway Av	Broadway Av	Girard Rd	2	1	41.0	306	48	875	54	61	Zone 4	40	15890	816	53	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	35,000	35,000	187,302	94
16451	1907	6690	90		Dartmouth Rd	18th Av	17th Av	4	1	34.0	306	68	1,428	37	34	Zone 4	40	14595	306	34	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.68	0	46,410	46,410	46,410	94
16270	228	10080	400		Evergreen Rd	90 W290 OFF Ramp	Indiana Av	1	1	75.0	916	301	8,004	57	58	Zone 4	40	16740	916	58	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	320,160	320,160	320,160	94
16596	244	10670	50		Flora Rd	Trent Av	Wellesley Av	2	1	30.0	1,339	228	4,686	56	53	Zone 4	40	16220	1,336	58	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40.00	0	187,440	187,440	187,442	94
10892	1794	11090	10		Glenn Rd	38th Av	34th Av	4	1	36.0	469	93	1,833	36	32	Zone 4	40	16390	786	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.68	0	59,473	63,479	124,391	94
14393	1794	11090	20		Glenn Rd	38th Av	Glenn Ct	4	1	36.0	300	62	1,259	49	40	Zone 4	40	16390	786	36	5	Selected Yr 5	55	FWM + Thick Overlay > 2.0 - 3.3 + Spot Patch	32.68	0	43,918	43,918	124,391	94
11913	34	14580	300		Mission Av	McDonald Rd	Blake Rd	2	1	40	1,327	354	7,423	57	54	Zone 4	40	16320	9154	52	5	Selected Yr 5	53	FWM – Thick Overlay (> 2.0 - 3.3)	40	0	297,320	297,320	652,920	94