

# JOINT TRANSPORTATION RESEARCH PROGRAM

INDIANA DEPARTMENT OF TRANSPORTATION  
AND PURDUE UNIVERSITY



## Crawfordsville Technical Services Asset Management Workflow Improvement Project



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## JOINT TRANSPORTATION RESEARCH PROGRAM

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## EXECUTIVE SUMMARY

### Introduction

The Indiana Department of Transportation (INDOT) is divided into six districts, with district offices located in LaPorte, Fort Wayne, Crawfordsville, Greenfield, Vincennes, and Seymour. Each district has a Technical Services Department who, with support from INDOT Central Office staff, are responsible for managing INDOT assets and providing technical support to the district (including capital programs, maintenance, construction projects, and others). They also provide input to statewide asset management and capital programs. Each Technical Services Department has assigned asset owners who are responsible for the management of assets such as roadways/pavement, bridges, large culverts, small culverts, traffic/safety, mobility, and (in the case of Crawfordsville) drainage.

The researchers of this project were chartered to work with the Technical Services Department in the Crawfordsville District by using Value Stream Mapping (VSM) techniques to identify and recommend improvements to the asset management workflows.

### Findings

The most significant issue identified by the Crawfordsville Technical Services project team is the unbalanced workload throughout the year and the concentrated time demand in the fall to support the Annual Call process. This time demand hinders the effectiveness of the process and the quality of the results.

While numerous actions have been recommended, and some piloted, those with the highest impact will address this fundamental issue.

1. Implement early scoping on select projects.
  - Use the Asset Management 20-Year Plans to identify low-risk projects which can have scoping started up to a year ahead, thereby leveling the workload for the asset managers/owners.

2. Increase on-call consulting resources.
  - Increase both the budget and the number of on-call consultants to enable an early start to scoping.
3. Implement a deadline for changes to the Annual Call process and scoring system.
  - This deadline will limit increases to the already high time demands late in the year.

### Implementation

VSM techniques were used to analyze the following four workflows of the Crawfordsville Technical Services Department's asset management:

1. Annual Call process,
2. maintenance work planning process,
3. discretionary funding process, and
4. systemic funding process.

For each workflow, the Crawfordsville Technical Services team developed a current state Value Stream Map (VSM) and analyzed it for improvement opportunities. Preliminary results of this analysis were reviewed by key INDOT Central Office personnel and Technical Services personnel at four of the other five districts. Feedback from these reviews, along with the Crawfordsville team's analysis and insights, were used to generate 24 recommendations for improvement (17 actions internal to Crawfordsville Technical Services and seven external actions to Crawfordsville but within INDOT).

The project team also developed future state VSMs that depicted the projected workflows if the recommended actions were implemented.

The current state VSM was analyzed extensively, yielding numerous opportunities for improvement, including those listed above. Recommended actions were developed, and select key actions were implemented on a pilot basis. Prototype Excel models were developed to enable the analysis, pilot implementation, and simulate the desired outcomes in the future state VSM.

## CONTENTS

1. INTRODUCTION .....	1
2. METHODOLOGY .....	1
3. RESULTS/ACTIVITY SUMMARY .....	2
3.1 Conduct VSM Workshop .....	2
3.2 Identify Technical Services Value Streams .....	2
3.3 Develop Current State VSMS .....	3
3.4 Review Current State VSMS with Other Districts and Central Office .....	3
3.5 Analyze Current State VSMS for Improvement Opportunities .....	4
3.6 Pilot Recommended Actions .....	7
3.7 Develop Future State Value Stream Maps .....	8
3.8 Develop Future State Action Plan .....	8
4. CONCLUSIONS .....	11
APPENDICES	
Appendix A. Current State Value Stream Maps .....	12
Appendix B. Current State Value Stream Maps with Kaizen Bursts .....	12
Appendix C. Future State Value Stream Maps .....	12

## LIST OF FIGURES

Figure	Page
<b>Figure 2.1</b> Flow diagram of the project methodology	1
<b>Figure 3.1</b> The first step in the project methodology was to conduct the VSM workshop	2
<b>Figure 3.2</b> Primary functions and deliverables of technical services	2
<b>Figure 3.3</b> The second step in the project methodology was to identify value streams	3
<b>Figure 3.4</b> Selection of technical services value streams to map	3
<b>Figure 3.5</b> The third step in the project methodology was to develop current state VSMs	3
<b>Figure 3.6</b> The fourth step in the project methodology was to review the VSMs with other districts and Central Office	4
<b>Figure 3.7</b> Details of interviewees at the districts and Central Office	4
<b>Figure 3.8</b> Comparison of districts on select discussion topics	5
<b>Figure 3.9</b> The fifth step in the project methodology was to analyze the current state VSMs for improvement opportunities	5
<b>Figure 3.10</b> The Crawfordsville District roadway asset owner's typical workload throughout the year	6
<b>Figure 3.11</b> Internal issues and recommended actions	6
<b>Figure 3.12</b> External issues and recommended actions	7
<b>Figure 3.13</b> The sixth step in the project methodology was to pilot recommended actions	7
<b>Figure 3.14</b> Recommended actions selected to be piloted	8
<b>Figure 3.15</b> Concept diagram for phased scoping	8
<b>Figure 3.16</b> Example of project classification for phased scoping	9
<b>Figure 3.17</b> The seventh step in the project methodology was to develop future state VSMs	9
<b>Figure 3.18</b> The final step in the project methodology was to develop a future state action plan	9
<b>Figure 3.19</b> Actions to achieve VSM future state—internal to technical services	10
<b>Figure 3.20</b> Actions to achieve VSM future state—external to technical services	10

## 1. INTRODUCTION

The Indiana Department of Transportation (INDOT) is divided into six districts, with district offices located in LaPorte, Fort Wayne, Crawfordsville, Greenfield, Vincennes, and Seymour. Each district has a Technical Services Department with responsibility (with support from INDOT Central Office staff) for managing the INDOT assets within the district and providing technical support to the district (including capital programs, maintenance, construction projects, and others). They also provide input to statewide asset management and capital programs. Each technical services department has assigned asset owners responsible for management of assets such as roadways/pavement, bridges, large culverts, small culverts, traffic/safety, mobility, and (in the case of Crawfordsville) drainage.

This project was chartered to work with the Technical Services Department at the Crawfordsville District, utilizing VSM techniques to identify and recommend improvements to the asset management workflows.

## 2. METHODOLOGY

Continuous improvement concepts and tools were used as the fundamental methodology for this project. The overall approach was to identify a current state of the Crawfordsville Technical Services processes,

analyze the current state to identify opportunities for improvement, and then develop a desired future state and associated recommendations for actions to move toward the future state.

A project team was established with members of the Crawfordsville Technical Services staff, including.

- Technical Services Director (TSD) (Bill Smith)
- System Asset Manager (SAM) (Scott Chandler)
- Asset Owners
  - Traffic/Safety (Tim Watson)
  - Mobility (also Scoping Manager) (Mike Eubank)
  - Pavement/Roadway (Vanessa McCauley)
  - Bridge/Large Culvert (Chris Wheeler)
  - Small Culvert (Dan Sturgeon) (replaced mid-project by Jessica Lindley)
  - Drainage/Special Projects (Joe Mallory)

The team developed current state process flow diagrams using a process called VSM. The preliminary results were shared with Technical Services staff members from other INDOT districts, as well as key INDOT Central Office staff. The Crawfordsville Technical Services staff then identified and prioritized potential improvement opportunities and piloted selected actions where feasible. Then the team used these results to develop future state VSMs and associated action plans. Figure 2.1 depicts the overall project methodology.

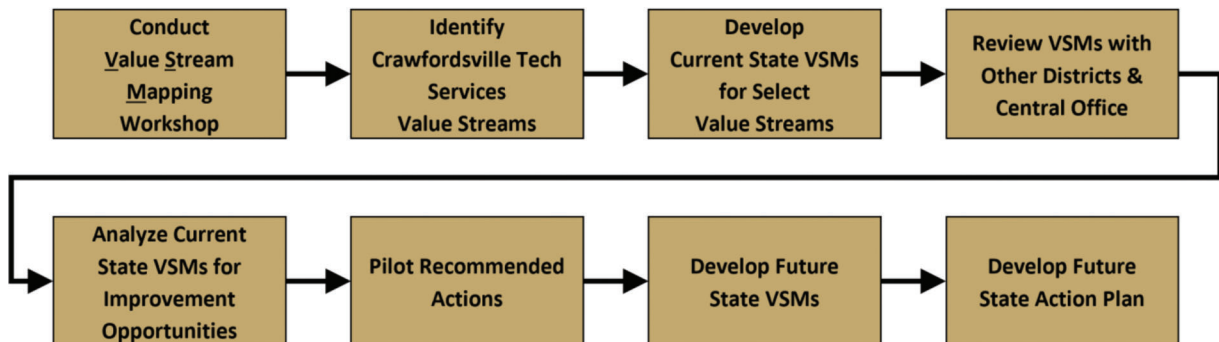


Figure 2.1 Flow diagram of the project methodology.

### 3. RESULTS/ACTIVITY SUMMARY

#### 3.1 Conduct VSM Workshop

As outlined in the Figure 3.1, the project team participated in a half-day VSM workshop on February 14, 2022, which included the following.

- An overview VSM methodology and lean manufacturing principles.
  - Identification of the primary deliverables of the Technical Services operation (see Figure 3.2).
  - Development of preliminary current state VSM of the Annual Call process, using sticky notes and markers, capturing the team’s knowledge, and understanding of the overall process flow.
  - Brainstorming of current problem areas, pain points, and opportunities for improvement.
  - Discussion of how the success of this project could be measured (i.e., what were we trying to improve, and how could improvement of the process be quantified).
- The team agreed that the focus should be on efficiency improvements and ways to balance the workload throughout the year. Each year there is concentrated

time demand late in the year to support the Annual Call for projects, and the intensity can lead to shortcomings in effectiveness and quality of the output.

- The team was unable to identify specific objective measurables by which to assess the success of this project but accepted that subjective evaluation of the improvements would have to suffice.

#### 3.2 Identify Technical Services Value Streams

Over the next 8 months, the team met 18 times (typically 1/2 days sessions) to execute the project methodology.

Based on the insights gained from the VSM workshop, the team identified the core value streams for which Technical Services is responsible (or into which it provides significant contribution) (see Figure 3.3 and Figure 3.4). The team selected four value streams to focus on improving, based on overall importance, required time commitments, and perceived potential for improvement.

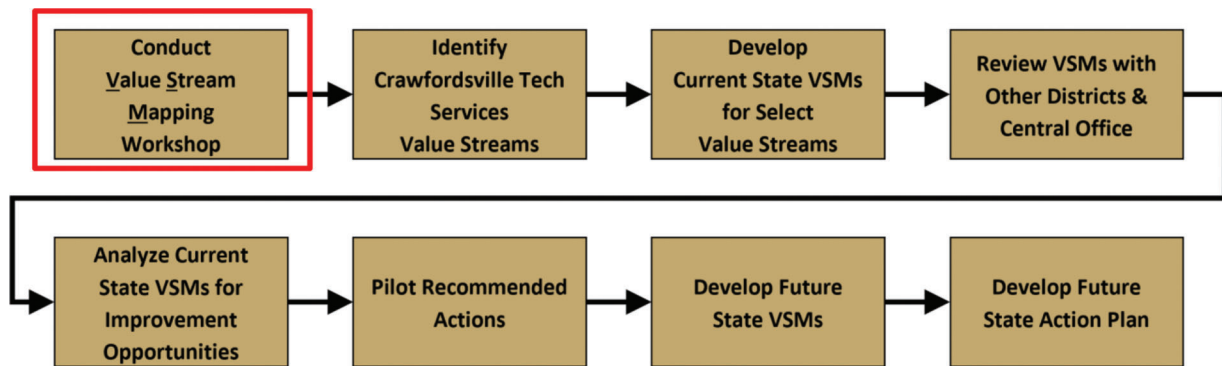


Figure 3.1 The first step in the project methodology was to conduct the VSM workshop.

Function/Deliverable	Comments
List of Candidate Projects Annual Call	Scopes, Costs, & Scores
Inputs to Maintenance Work Plans	Road, Bridge, Culverts, & Traffic, not Mobility
I.D.I.Q. (Indefinite Delivery/Indefinite Quantity)	Road & Bridges only Reactionary; urgent needs
Support/Service to active, in-process projects	* RFP Reviews * Cost Overruns, Scope Changes, Decisions, Funding, Program Adjustments * Change Management
Customer Service requests	
Emergencies/urgent needs	
Maintenance Support	
Relinquishments	
Institutional Projects	Scoping for Correctional facilities, DNR, Police, etc.

Figure 3.2 Primary functions and deliverables of technical services.



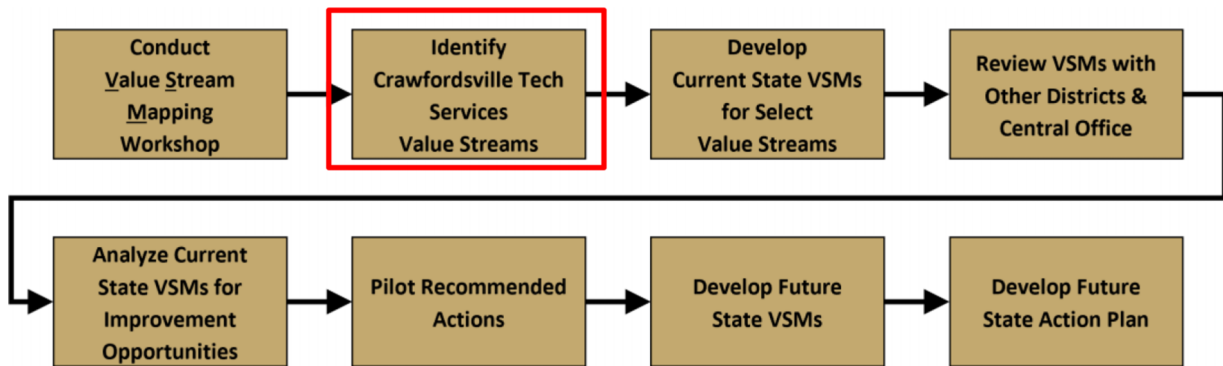


Figure 3.3 The second step in the project methodology was to identify value streams.

Value Stream	Selected for VSM
Capital Projects (Annual Call)	Yes
Maintenance Work Planning	Yes
Discretionary Funding Projects	Yes
IDIQ Projects	No
Systemic Funding Projects	Yes
Urgent Projects	No
Institutional Projects	No
Emergency Projects	No

Figure 3.4 Selection of technical services value streams to map.

### 3.3 Develop Current State VSMs

The preliminary VSM developed during the VSM workshop for the Annual Call process was used to create a computerized version of the current state VSM (Figure 3.5). As this current state VSM was detailed, additional observations, clarification, and data collection were conducted to yield as accurate of a depiction of the process as possible. VSMs were similarly generated for maintenance work plans, discretionary projects, and systemic projects (note that the discretionary and system VSMs were combined to enable depiction of the overlap in the processes).

Appendix A displays the four completed current state VSMs.

### 3.4 Review Current State VSMs with Other Districts and Central Office

In June, individual review sessions were conducted with Technical Services staff members at the Greenfield District, the Seymour District, the Vincennes District (held in Evansville), and the Fort Wayne District. Due to scheduling constraints, no session was conducted with the LaPorte District staff (Figure 3.6). Individual review sessions were also conducted at INDOT Central Office with Louis Feagans (Managing Director of Asset Management and Planning), Todd Shields (Statewide Asset Management Engineer) and Justin Berger (Statewide Highway Maintenance Director) (see Figure 3.7).

Detailed notes were taken during these sessions, and subsequently shared and reviewed with the Crawfordsville Technical Services project team. This information was used for the following:

- validation of the VSMs,
- confirmation of consistency (or lack thereof) of some of the pain points and opportunities for improvement already identified, and

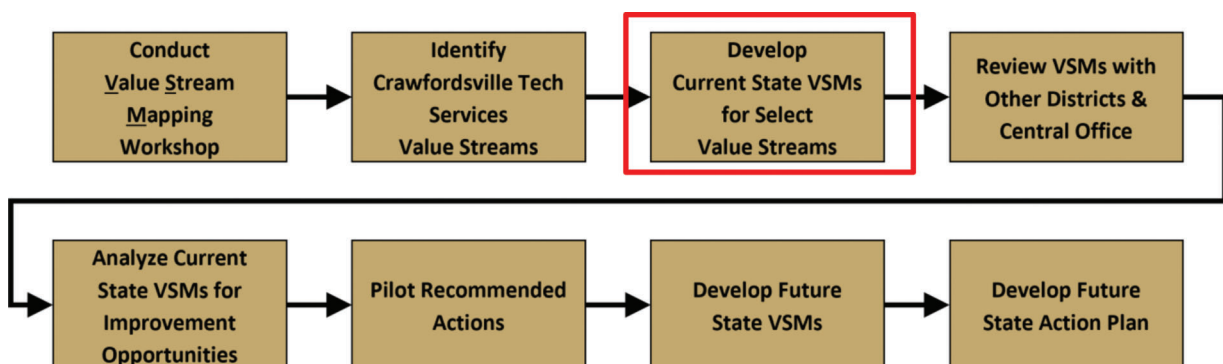


Figure 3.5 The third step in the project methodology was to develop current state VSMs.

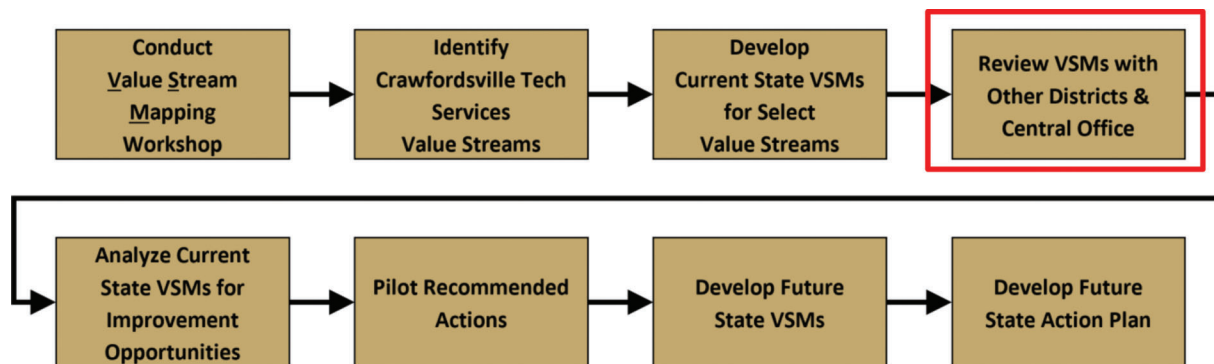


Figure 3.6 The fourth step in the project methodology was to review the VSMs with other districts and Central Office.

Date	Interview Location	Interviewee(s)	District Staff						Central Office Staff			
			SAM	Pavement Asset Engineer	Bridge Asset Engineer	Traffic/Safety Engineer	Scoping Engineer/Manager	Culvert Asset Engineer	Managing Director of Asset Management and Planning	Statewide Asset Management Engineer	Statewide Highway Maintenance Director	
05/17/22	Central Office	Louis Feagans							1			
05/17/22	Central Office	Todd Shields								1		
05/17/22	Central Office (Virtual)	Justin Berger									1	
06/01/22	Greenfield District	Amy Groff, Luis Laracuente, Darryl Wineinger, Spenser Vaughn	1	1	1	1						
06/06/22	Seymour District	Bob Tally, Ben Meadows, Abbey Mantsch	1	1			1					
06/07/22	Vincennes District (at Evansville Sub)	Khalil Dughaihs, Duane Decker, Jason Heile, Katrina Pinkstaff	1	1	1		1					
06/10/22	Fort Wayne District	Nathan Edwards, Andy Herber, Brandon Forrester, Doug Moser, Susan Doell, Keith Lytton	1	1	1		2	1				
7 Interviews			4	4			4	1	1	1	1	
											People Interviewed:	16

Figure 3.7 Details of interviewees at the districts and Central Office.

- identification of best practices and additional opportunities for improvement for Crawfordsville Technical Services.

Central Office interviews *primary takeaway*.

- Strong emphasis on the utilization of the *20-year plans*, for both Capital Programs project selection and Maintenance Work Plans.

Districts session *primary takeaway*.

- The most common pain point was the need to *not change the scoring process* (or any other aspects of the project selection process) mid-to-late in the process of preparing projects for the Annual Call. This concern was emphasized by multiple system asset managers and asset owners throughout the state.

Highlights of some of the similarities and differences between districts regarding some common topics that were discussed are summarized in Figure 3.8.

### 3.5 Analyze Current State VSMs for Improvement Opportunities

Note first that this VSM and analysis was conducted over a period of several months (Figure 3.9).

During this time, as is typical, numerous improvement activities were already conceived and being initiated/implemented. The VSMs are therefore not “snapshots” of the current state of the process but reflect the state at the beginning of the project, combined with some indications of these improvements that were made throughout the project (as noted below, where applicable).

Analysis of the current state VSMs included the following.

- Identification of issues, problem areas, and ideas for improvement for each of the current state VSMs (represented on the VSMs in Appendix B by yellow Kaizen Bursts) included the following.
  - From *Call Process VSM*
    - Issues/Problems
      - Condition data is poor and coming in late.
      - Roadway asset process keeps changing.
      - Need to formalize Pre-Van Trip Coordination Meeting procedure (currently happens but informal).
      - Would like list of corridor projects by early March.
      - Not getting much feedback from District Capital Programs on initial candidate list

Topic	Fort Wayne	Greenfield	Seymour	Vincennes
20-Year Plan	"Evolving"	Bridge OK/Pavement not		"Not mature yet"
Van Trip App	No	Yes (2nd Year)	No	No
Early start on Scoping	No (not in favor)	Yes (Bridge)	No	No (not in favor)
MWP (Pavement)(start in prior year?)	Yes (Field visits)	No	No	Yes (list only, not field visits)
MWP App?	Yes	Yes	?	? ("Driving Session")
NDP?	Yes	Yes	"Not as much as GF yet"	"Not much yet" (use folders)
On-Call Consultants	No issues w/ timing	?	Most T/S/M projects (budget limits a concern)	Mostly for T/S/M

Figure 3.8 Comparison of districts on select discussion topics.

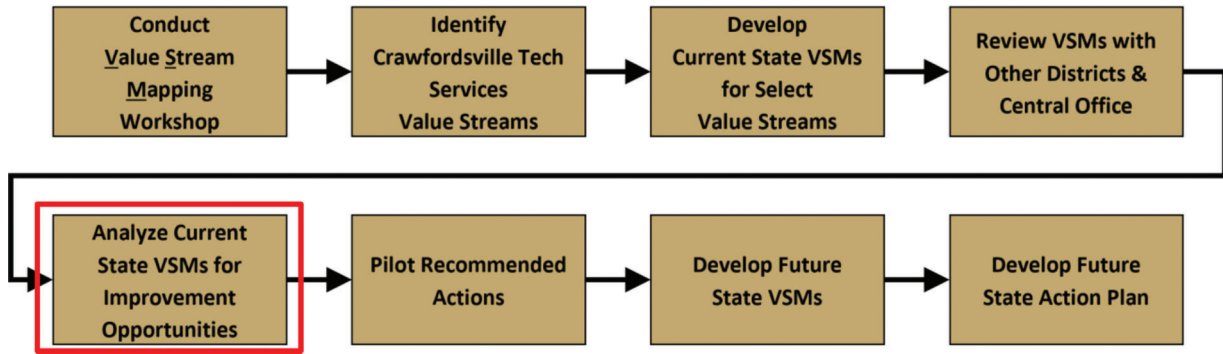


Figure 3.9 The fifth step in the project methodology was to analyze the current state VSMs for improvement opportunities.

- Testing requests being submitted too late (by INDOT Central Office).
- Hydraulics analysis coming in late.
- Data accessibility to consultants (e.g., condition data not available).
- "Noise" is higher in summer.
- On-call scopes coming in late.
- Timing of Geotech meeting.
- Geotech report coming in late.
- Improvement Ideas
  - Focused call work activities (dedicated time).
  - Start on-call consultant assignment earlier.
  - Conduct Division Tech Services Van Trip earlier in the year (March suggested).
  - Get earlier start on gather data for next year.
  - Move target date to before holidays (12/15/20xx or earlier).
  - Feed long-range needs data into NDP/Map/GIS.
- From *Maintenance Work Plan VSM*
  - Issues/Problems
    - Need direction for purchasing to come from maintenance, not technical services.
  - Improvement Ideas
    - Use GIS maps (planned for next year).
- From *Discretionary and Systemic VSM*
  - Issues/Problems
    - Traffic/safety doesn't use discretionary much.
    - Must research whether it's 2nd chip seal since rumbles added.
    - Determining locations of RPMs/rumbles late can put strain on delivery.
  - Improvement Ideas
    - 5-year plan for systemic.
    - Lock in systemic and use discretionary for your flexibility.
- Identification of pain points and improvement ideas highlighted during the review of the interviews with the other districts and INDOT Central Office (note that some overlap with Kaizen Bursts above). These included the following.
  - Virtual van trip app.
  - Data accessibility to consultants (e.g., condition data not available) (Kaizen Burst above).
  - Biggest pain point: Can't tweak the scoring mid-process (Kaizen Burst above).
  - Improved attendance/participation in van trips by doing by sub-district.
  - Budgets for on-call consultants limits capacity.
  - Hydraulics coming in late (Kaizen Burst above).
  - New culvert inspection data needs updated (i.e., when maintenance or construction replaces pipes, not getting the feedback to the asset owners and not getting into the database) (and not getting its new NBI #).
- Analysis of the asset owners'/engineers' typical work loading throughout the year. The roadway asset owner's work loading is depicted in Figure 3.10.
  - While this diagram does not depict the magnitude of the work in each category, it does reflect the inherent imbalance in the work loading over the year. There are numerous and high demands for asset owners' time during the summer associated with *Construction Support, IDIQ Projects, Institutional Support, various Daily Management* activities. This time demand inhibits activity on the Annual Call activities, thereby pushing them to the fall. This creates

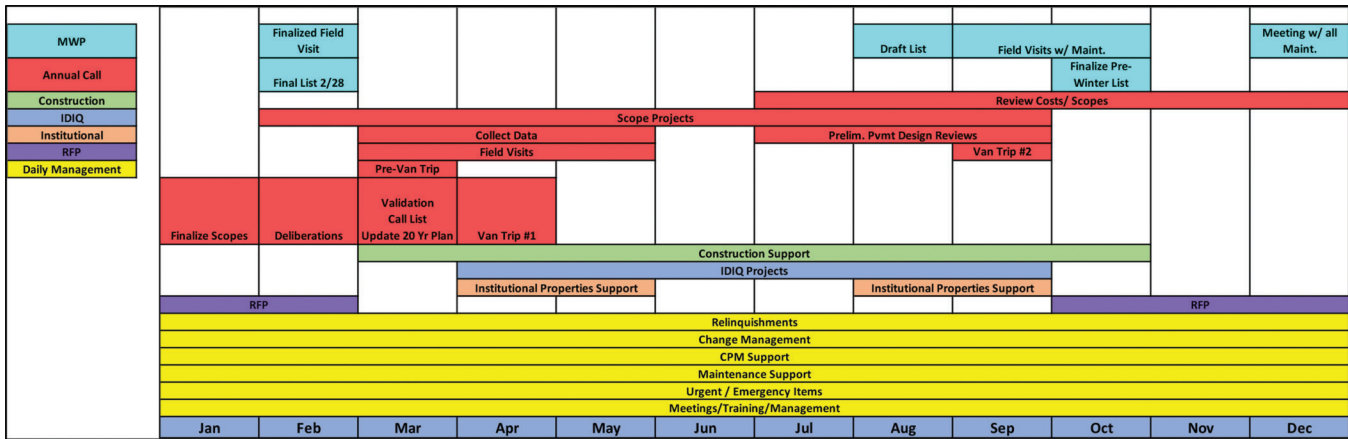


Figure 3.10 The Crawfordville District roadway asset owner’s typical workload throughout the year.

Item #	Value Stream	Issue(s)	Recommended Action	Priority
1	Annual Call	Scoping data coming in late	Earlier start on getting data for this year's ("Year 6") Scoping	High
2	Annual Call	Scoping data coming in late; On-Call Scopes coming in late; Asset Owners workload unbalanced throughout the year (noise in summer/season)	Phased Scoping (Early start on Scoping "Year 7" projects)	High
3	Annual Call	Pre-van trip meeting not structured, not as efficient as could be	Formalize process for Pre-Van Trip meeting (i.e., agenda, inputs, outputs)	Low
4	Annual Call	Tech Services Van Trip not early enough	Conduct Division Van Trip earlier in year (currently April, March suggested)	Medium
5	Annual Call	On-Call Scopes coming in late	Start On-Call Consultant Scoping earlier (for "Year 6" projects) (NTPs July for 2027 Call; April this year)	High
6	Annual Call	On-Call Scopes coming in late	Add sub-milestones & deadlines for On-Call Consultant scoping (Years 6 and 7)	High
7	Annual Call	Improve Virtual Van Trip participation/engagement	Do Virtual Van Trips by Sub	Medium
8	Annual Call	Improve Virtual Van Trip participation/engagement	Use Virtual Van Trip app	Medium
9	Annual Call	Due date in January confounded by Holiday schedules	Move Target Date for "Review/Sign Scopes" to before Holidays (1/14/xx now)	High
10	Annual Call	Asset Owners workload unbalanced throughout the year (noise in summer/season)	Focused "Call" Work Activities (e.g., dedicated week)(10/31 - 11/4)	Medium
11	Annual Call	Crawfordsville uses "Long Range Needs Database" vs. NDP used by GF & others	Feed info from Long Range Needs Database into NDP/MAP/GIS?	Low
12	Annual Call	Timing of list of Corridor Projects	Would like list of Corridor Projects by March	Medium
13	MWP	Providing inputs directly from Asset Owners to Purchasing can lead to issues.	Need directions for Purchasing to come from Maintenance	Medium
14	MWP	Not using GIS Maps for MWP planning	Use GIS Maps (planned for next year)	Medium
15	Systemic	Determining locations late can put strain on delivery	Develop 5-year plan for Systemic, with locations	Medium
16	Systemic	Have to research whether it's 2nd Chip Seal	Capture date of added Rumbles in a database (what database?)(Roadway Planning Reference Database) (Intern project?)	Low
17	Discretionary	Traffic/Safety doesn't use Discretionary much	Traffic/Safety increase utilization of Discretionary (e.g., Lock in Systemic and use Discretionary for the needed flexibility)	Medium

Figure 3.11 Internal issues and recommended actions.

- a heavy time requirement in the fall for the Annual Call process.
- As identified in the VSM workshop at the beginning of the project (see Section 3.1), one of the overall goals of the project was to drive efficiency improvements and find ways to balance the workload throughout the year.

Based on the above analysis, a list of issues and recommended actions was developed for both internal issues (i.e., those within the control of Crawfordville Technical Services) (Figure 3.11) and external issues (i.e., those needing support from other organization within INDOT) (Figure 3.12).

Item #	Process	External Issue	Recommended Action	Priority
1	Annual Call	On-Call Scopes coming in late; Not starting scoping until year due.	Add On-Call Consultant capacity (i.e., budget AND 2nd On-Call Consultant)	High
2	Annual Call	Roadway Asset Process Keeps Changing ( <i>actually applies to all assets</i> )	Need deadline for effectivity for process/scoring changes (for THIS year's call)(suggest 7/1)	High
3	Annual Call	Testing requests submitted too late (by C/O)	Need deadline (consistent with 9/1 deadline for preliminary pavement design)	High
4	Annual Call	Timing of Geotech Meeting & outputs (results/recommendations from C/O Geotech)	Need deadline (currently typically November; need ealier) (Having new Drainage Asset Owner role this year will help)	Medium
5	Annual Call	Waiting for Hydraulics Analysis	Culvert 20-year plan should help allow pulling ahead and giving to On-Call consultants. (But still has to be reviewed by C/O Hydraulics, but still at least have data with which to draft scopes)	Medium
6	Annual Call	Data accessibility to Consultants (e.g., Condition data, Small Culvert data, Pavement History). Requests to Asset Owners adds to "noise".	Make data accessible to consultants read-only.	Low
7	MWP	New Culvert inspection data needs updated	When Maintenance or Construction replaces pipes, need way to get the feedback to the Asset Owners & get into the database)(& get its new NBI & CLV #)(Can this be automated, at least for a notification?)	High

Figure 3.12 External issues and recommended actions.

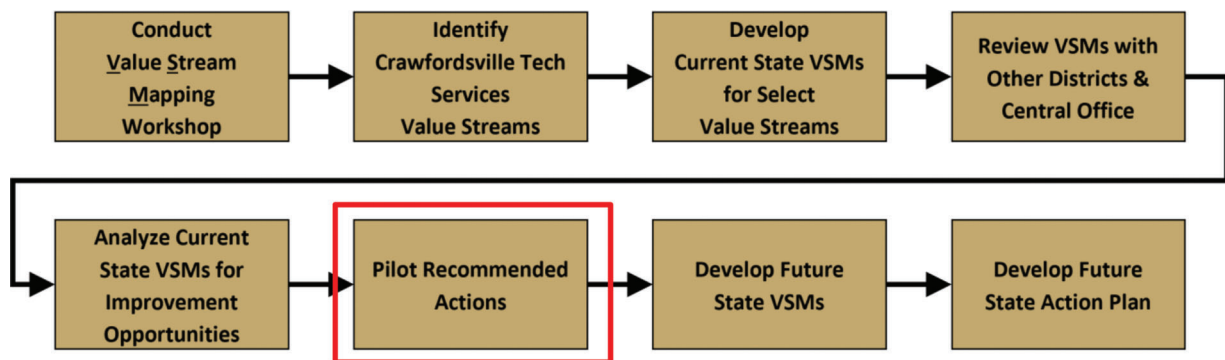


Figure 3.13 The sixth step in the project methodology was to pilot recommended actions.

### 3.6 Pilot Recommended Actions

As the internal issues and recommended actions (Figure 3.11) were being developed, consideration for each item was given to whether the action could be piloted within the timeframe of the project, or within this year’s Annual Call (Figure 3.13).

Those recommended actions which were selected to be piloted are shown in Figure 3.14.

All the piloted recommended actions are self-explanatory and in-process, except for Item # 2 in Figure 3.14, *Phased Scoping (Early start on Scoping “Year 7” projects)*, which merits further explanation.

To maximize the value of the 20-year plans, and to level the workload across the year, the team developed this approach to allow starting the scoping process up to one year early for select projects.

The first step is to classify projects for a given year (Year 7) from the 20-year plans in to three categories (shown in Figure 3.15 as Class A, Class B, and Class C). Class A projects (those with minimal risk and high confidence in work type) would be triggered to have scoping initiated up to a year in advance. Class B

projects (low risk) would be triggered to have scoping initiated up to 6-months in advance. Class C projects would go through the normal Annual Call scoping timeline.

Through increased use of on-call consultants for these early-start projects would alleviate the intensity of the scoping activities in the fall of each year, allowing for more thorough and more accurate scoping results. Specifically, it was identified that there would be benefits in early starts on the following:

- preliminary pavement designs,
- hydraulics,
- network level traffic/safety/mobility data and analysis,
- drainage analysis, and
- small culvert conditions.

The project team attempted to pilot this phased scoping approach. The Crawfordsville Bridge and Roadway Asset Owners developed sample classifications for 2029 projects (see Figure 3.16 for roadway example), and the asset owners and scoping manager met to discuss project coordination and move forward.

Item #	Value Stream	Issue(s)	Recommended Action	Priority	Pilot Implementation?
1	Annual Call	Scoping data coming in late	Earlier start on getting data for this year's ("Year 6") Scoping	High	
2	Annual Call	Scoping data coming in late; On-Call Scopes coming in late; Asset Owners workload unbalanced throughout the year (noise in summer/season)	Phased Scoping (Early start on Scoping "Year 7" projects)	High	Yes*
3	Annual Call	Pre-van trip meeting not structured, not as efficient as could be	Formalize process for Pre-Van Trip meeting (i.e., agenda, inputs, outputs)	Low	
4	Annual Call	Tech Services Van Trip not early enough	Conduct Division Van Trip earlier in year (currently April, March suggested)	Medium	Yes
5	Annual Call	On-Call Scopes coming in late	Start On-Call Consultant Scoping earlier (for "Year 6" projects) (NTPs July for 2027 Call; April this year)	High	Yes
6	Annual Call	On-Call Scopes coming in late	Add sub-milestones & deadlines for On-Call Consultant scoping (Years 6 and 7)	High	Yes
7	Annual Call	Improve Virtual Van Trip participation/engagement	Do Virtual Van Trips by Sub	Medium	Yes
8	Annual Call	Improve Virtual Van Trip participation/engagement	Use Virtual Van Trip app	Medium	Yes
9	Annual Call	Due date in January confounded by Holiday schedules	Move Target Date for "Review/Sign Scopes" to before Holidays (1/14/xx now)	High	Yes
10	Annual Call	Asset Owners workload unbalanced throughout the year (noise in summer/season)	Focused "Call" Work Activities (e.g., dedicated week)(10/31 - 11/4)	Medium	Yes
11	Annual Call	Crawfordsville uses "Long Range Needs Database" vs. NDP used by GF & others	Feed info from Long Range Needs Database into NDP/MAP/GIS?	Low	
12	Annual Call	Timing of list of Corridor Projects	Would like list of Corridor Projects by March	Medium	
13	MWP	Providing inputs directly from Asset Owners to Purchasing can lead to issues.	Need directions for Purchasing to come from Maintenance	Medium	Yes
14	MWP	Not using GIS Maps for MWP planning	Use GIS Maps (planned for next year)	Medium	
15	Systemic	Determining locations late can put strain on delivery	Develop 5-year plan for Systemic, with locations	Medium	
16	Systemic	Have to research whether it's 2nd Chip Seal	Capture date of added Rumbles in a database (what database?)(Roadway Planning Reference Database) (Intern project?)	Low	
17	Discretionary	Traffic/Safety doesn't use Discretionary much	Traffic/Safety increase utilization of Discretionary (e.g., Lock in Systemic and use Discretionary for the needed flexibility)	Medium	

\* Pilot implementation constrained by lack of On-Call Consulting capacity

Figure 3.14 Recommended actions selected to be piloted.

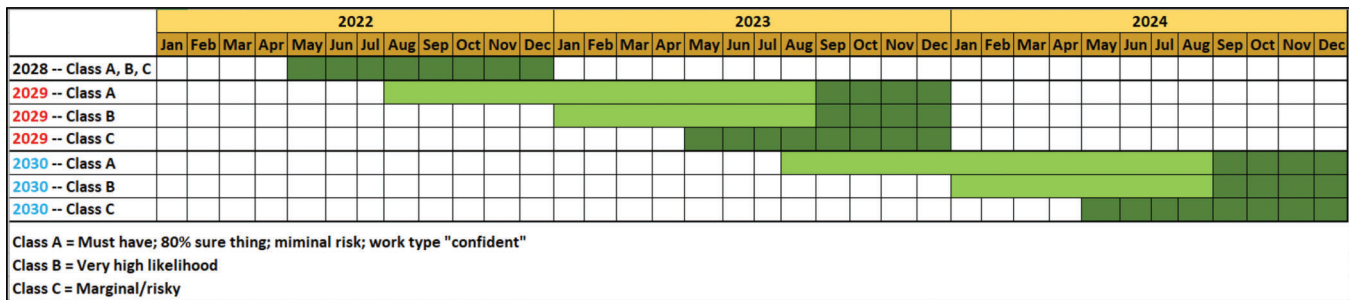


Figure 3.15 Concept diagram for phased scoping.

However, the pilot implementation was unable to proceed due to limited capacity and budget for on-call consulting. This stalled pilot implementation resulted in Recommendation #1 on the *External Issues and Recommendations List* in Figure 3.12.

### 3.7 Develop Future State Value Stream Maps

The next step in the project was to develop future state VSMs based on the projected completions of the recommended action (see Figure 3.17) Appendix C displays the completed future VSMs. In most cases, the differences between the current state and future state VSMs are subtle. Several of the

recommended actions do not impact the flow depicted in the VSM, but just the timing of the activities.

### 3.8 Develop Future State Action Plan

The action plan to achieve the future state VSMs (Figure 3.18) is essentially a systemization of the recommended actions detailed in Figure 3.11 and Figure 3.12. The internal actions require implementation of tools and systems to sustain the implementation beyond just the first year. Figure 3.19 and Figure 3.20 provide examples of the types of actions needed to sustain the implementation long term.

Scoping Group	PAVEMENT KEY	PLAN_FY	TREATMENT_CATEGORY	ROUTE_NAME	LOCATION_DESC	ROAD CATEGORY
A	10511	2029	Small Town + Min Str	US 41	From .84 mi S of SR 28 S Jct to .49 mi N of SR 28 S Jct	C1
C	10003	2029	Minor Structural	I-74	From .4 mi E of US 41 to .4 mi E of SR 25	A2
B	10097	2029	Preventive Maintenance	SR 63	From SR 263 S Jct to 0.10 mi S of SR 28	B2
C	10201	2029	Minor Structural	OLD US 52	From US 52 to 1.43 mi E of US 52	B2
B	10193	2029	Preventive Maintenance	SR 39	From 1.09 mi S of US 421 to US 421	C1
C	10529	2029	Minor Structural	US 231	From 0.40 mi N of SR 28 to 3.40 mi S of US 52 / SR 25	B2
A	10580	2029	Preventive Maintenance	US 421	From SR 39 to 1.59 mi N of SR 39	C1
A - Consultant	10560	2029	Minor Structural	US 36	From .60 mi W of SR 39 W Jct to 0.83 mi E of SR 39 E Jct (Danville)	B1
A - Consultant	10045	2029	Preventive Maintenance	SR 39	From 0.53 mi S of US 36 S Jct to US 36 S Jct	C1
C	10506	2029	Minor Structural	US 41	From 1.28 mi N of US 36 to SR 47	C2
A	10537	2029	Major Structural	US 40	From 1.47 mi (Belle St.) to 3.06 mi E of SR 59 (Harmony)	B1
A	10592	2029	Small Town + PM	US 136	From .4 mi W of SR 25 W Jct to .02 mi W of SR 25 E Jct (Waynetown)	C1
B	10021	2029	Preventive Maintenance	I-65	From 1.66 mi S of SR 39 to 1.07 mi S of US 52	A1
A - Consultant	10056	2029	Preventive Maintenance	SR 39	From 0.69 mi S of I-65 to 2.5 mi N of SR 32 (Lebanon)	B1
C	10067	2029	Minor Structural	SR 47	From US 421 to 4.58 mi E of US 421	C2
C	10083	2029	Minor Structural	SR 59	From 0.33 mi N of I-70 to 1.36 mi S of US 40	C1
A	10027	2029	Preventive Maintenance	I-65	From 0.80 mi N of SR 43 to 0.80 mi N of SR 18	A2
N/A	10023	2029	ATL + Maj Str	I-65	From 0.26 miles north of SR 28 to 0.54 mi S of SR 38	A1
N/A	10022	2029	ATL + Maj Str	I-65	From 0.80 mi N of SR 47 to 0.26 miles north of SR 28	A1
?	10125	2029	ATL + Maj Str	SR 43	From 0.43 mi N of SR 225 to 0.57 mi S of SR 18 S Jct (Moots Creek Br.)	B2
C	10543	2029	Minor Structural	US 40	From 1.87 mi E of SR 75 to 2.49 mi E of SR 75	B2
B	10568	2029	Preventive Maintenance	US 52	From Old US 52 (W. Lafayette) to US 231 E Jctn / SR 25	B1
C	10061	2029	Minor Structural	SR 47	From SR 234 to SR 32 S Jct	C2
C	10178	2029	Major Structural?	SR 26	From Illinois State Line to US 41 N Jct	C2
A - Consultant	10956	2029	Major Structural	SR 32	From 0.49 mi E of I-65 to 1.02 mi E of SR 39 (Lebanon)	C1

Figure 3.16 Example of project classification for phased scoping.

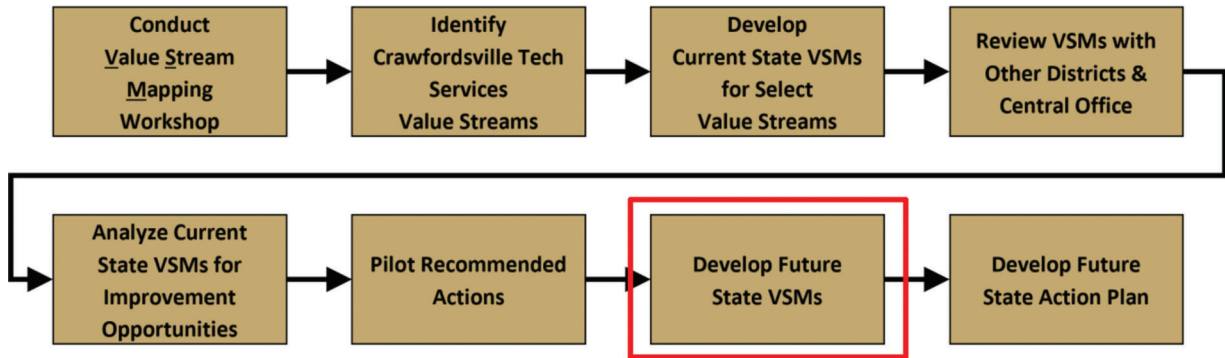


Figure 3.17 The seventh step in the project methodology was to develop future state VSMs.

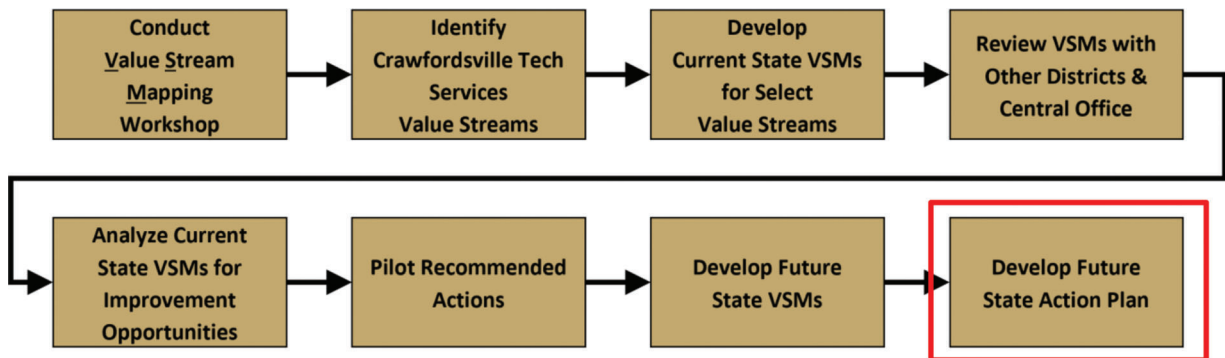


Figure 3.18 The final step in the project methodology was to develop a future state action plan.

Item #	Value Stream	Recommended Action	Actions for Systemic Implementation
1	Annual Call	Earlier start on getting data for this year's ("Year 6") Scoping	Establish systemic triggers to ensure starting at prescribed
2	Annual Call	Phased Scoping (Early start on Scoping "Year 7" projects)	* Establish/formalize project classification system * Integrate classification into project planning, so that each project has a programmed time to start scoping * Establish triggers to trigger early scoping each year.
3	Annual Call	Formalize process for Pre-Van Trip meeting (i.e., agenda, inputs, outputs)	Develop documented agenda and meeting input/output structure.
4	Annual Call	Conduct Division Van Trip earlier in year (currently April, March suggested)	Establish systemic triggers to ensure annual scheduling of Division Van Trip at prescribed time.
5	Annual Call	Start On-Call Consultant Scoping earlier (for "Year 6" projects) (NTPs July for 2027 Call; April this year)	Establish systemic triggers to ensure annual initiation of On-Call Scoping at prescribed time.
6	Annual Call	Add sub-milestones & deadlines for On-Call Consultant scoping (Years 6 and 7)	Establish documented process for managing milestones and deadlines of On-Call Consultants on ongoing basis.
7	Annual Call	Do Virtual Van Trips by Sub	None required
8	Annual Call	Use Virtual Van Trip app	None required
9	Annual Call	Move Target Date for "Review/Sign Scopes" to before Holidays (1/14/xx now)	None required
10	Annual Call	Focused "Call" Work Activities (e.g., dedicated week)(10/31 - 11/4)	To be determined after pilot completed.
11	Annual Call	Feed info from Long Range Needs Database into NDP/MAP/GIS?	Allocate/provide resource (e.g., IT, intern, etc.) to integrate the Long Term Needs Database information with NDP, etc.
12	Annual Call	Would like list of Corridor Projects by March	Establish systemic triggers to ensure completion by prescribed time.
13	MWP	Need directions for Purchasing to come from Maintenance	None required
14	MWP	Use GIS Maps (planned for next year)	None required
15	Systemic	Develop 5-year plan for Systemic, with locations	Allocate/provide resource to develop 5-year Plan for Systemic
16	Systemic	Capture date of added Rumbles in a database (what database?)(Roadway Planning Reference Database) (Intern project?)	Allocate/provide resource (Intern Project?) to capture data into Roadway Planning Reference Database
17	Discretionary	Traffic/Safety increase utilization of Discretionary (e.g., Lock in Systemic and use Discretionary for the needed flexibility)	None required.

Figure 3.19 Actions to achieve VSM future state—internal to technical services.

Item #	Process	External Issue	Recommended Action	Actions for Systemic Implementation
1	Annual Call	On-Call Scopes coming in late; Not starting scoping until year due.	Add On-Call Consultant capacity (i.e., budget AND 2nd On-Call Consultant)	Sustain increased budget for On-Call Consultant capacity.
2	Annual Call	Roadway Asset Process Keeps Changing ( <i>actually applies to all assets</i> )	Need deadline for effectivity for process/scoring changes (for THIS year's call)(suggest 7/1)	Establish deadline and policy for process/scoring changes.
3	Annual Call	Testing requests submitted too late (by C/O)	Need deadline (consistent with 9/1 deadline for preliminary pavement design)	Establish deadline for test requests.
4	Annual Call	Timing of Geotech Meeting & outputs (results/recommendations from C/O Geotech)	Need deadline (currently typically November; need earlier) (Having new Drainage Asset Owner role this year will help)	Establish deadline for Geotech results/recommendations.
5	Annual Call	Waiting for Hydraulics Analysis	Culvert 20-year plan should help allow pulling ahead and giving to On-Call consultants. (But still has to be reviewed by C/O Hydraulics, but still at least have data with which to draft scopes)	Sustain increased budget for On-Call Consultant capacity.
6	Annual Call	Data accessibility to Consultants (e.g., Condition data, Small Culvert data, Pavement History). Requests to Asset Owners adds to "noise".	Make data accessible to consultants read-only.	Allocate IT resources to make data accessible to Consultants.
7	MWP	New Culvert inspection data needs updated	When Maintenance or Construction replaces pipes, need way to get the feedback to the Asset Owners & get into the database>(& get its new NBI & CLV #)(Can this be automated, at least for a notification?)	Determine and implement way to get feedback to the Asset Owners & get into the database>(& get its new NBI & CLV #)

Figure 3.20 Actions to achieve VSM future state—external to technical services.



#### 4. CONCLUSIONS

The project team was successful in developing current state VSMs for four value streams, identifying numerous improvement opportunities, both internal and external to Crawfordsville Technical Services. Recommendations have been presented which will help make the asset management processes more efficient, leveling the workload across the year, with

should facilitate more effective and higher quality outputs and results.

In addition to the potential improvements in the Crawfordsville District, several of these improvements may be applicable to other districts.

The district will further benefit from using the VSMs as tools for training existing district personnel as well as new hires.

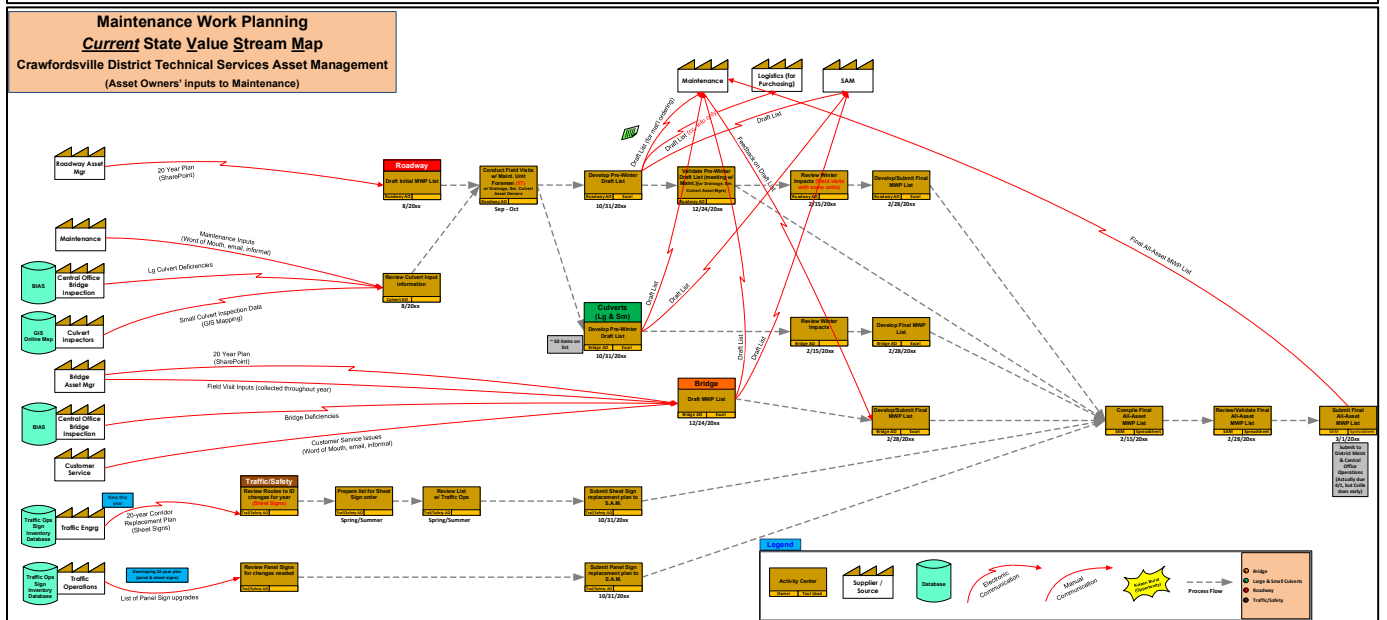
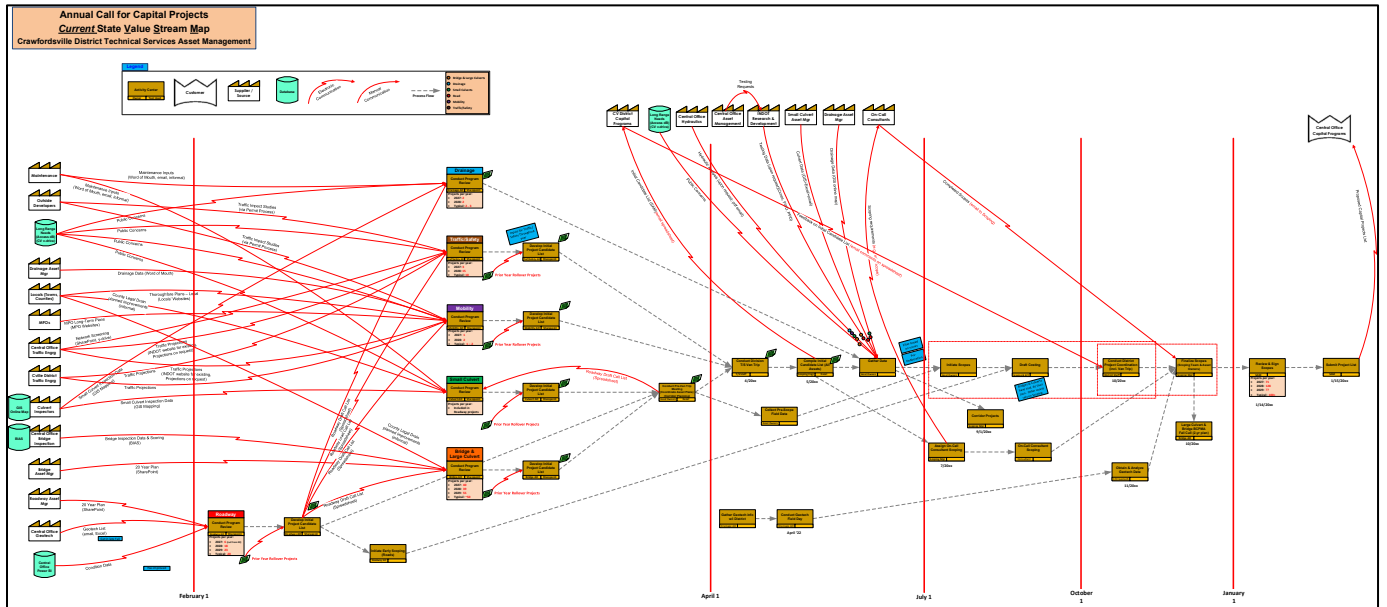
## APPENDICES

**Appendix A. Current State Value Stream Maps**

**Appendix B. Current State Value Stream Maps with Kaizen Bursts**

**Appendix C. Future State Value Stream Maps**

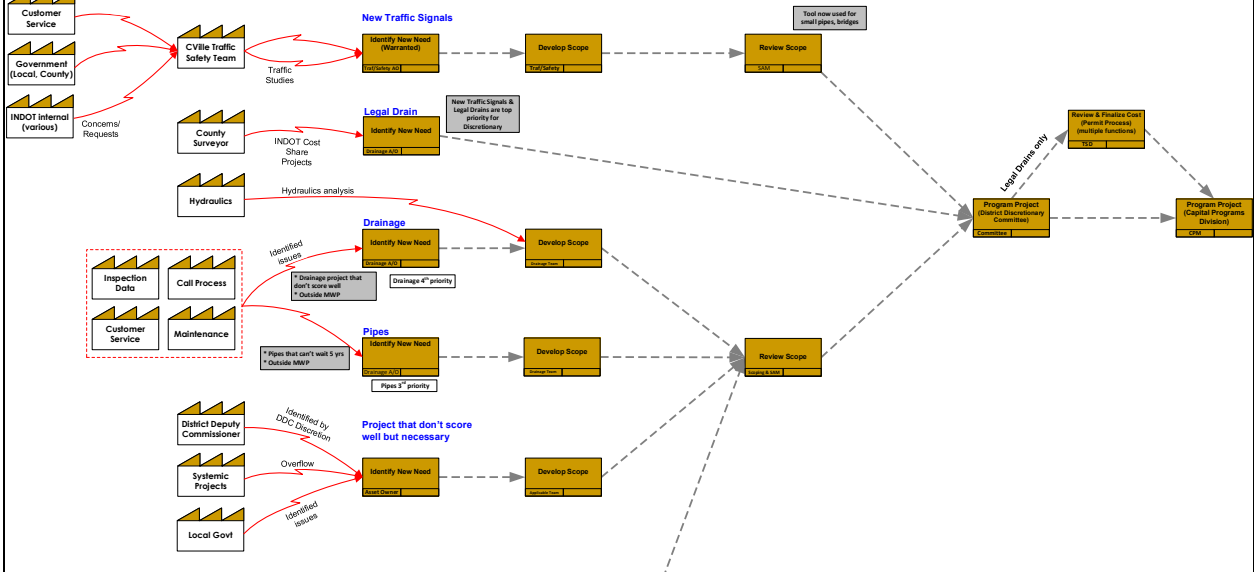
# APPENDIX A. CURRENT STATE VALUE STREAM MAPS



**Discretionary & Systemic Projects**  
**Current State Value Stream Map**  
 Crawfordsville District Technical Services Asset Management

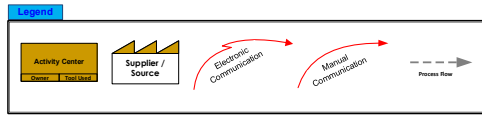
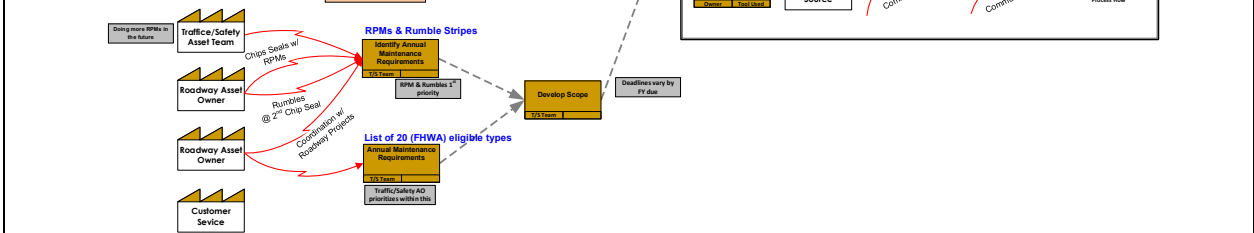
**Discretionary Funding**

2-3 Year horizon  
 \* \$3MM annual budget  
 (likely to increase to \$5-6 MM)

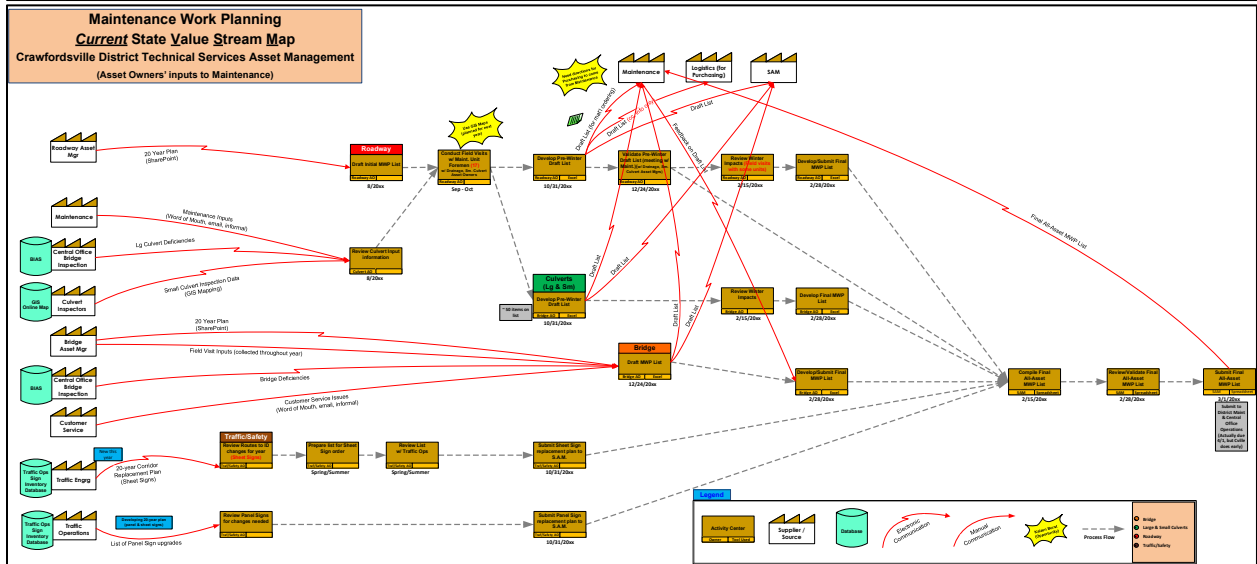
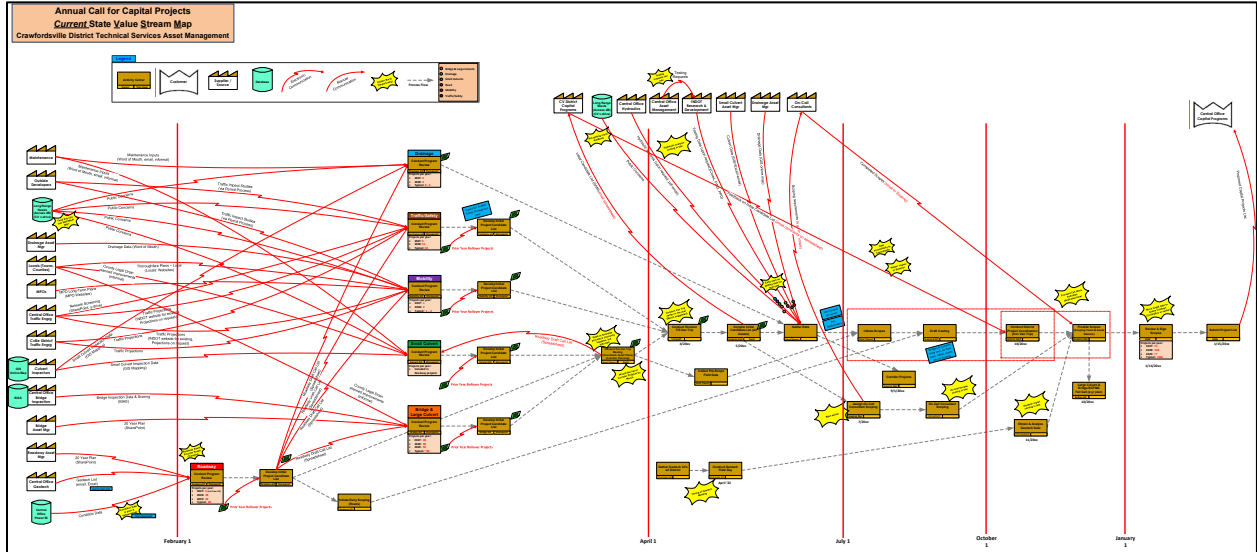


**Systemic Funding**

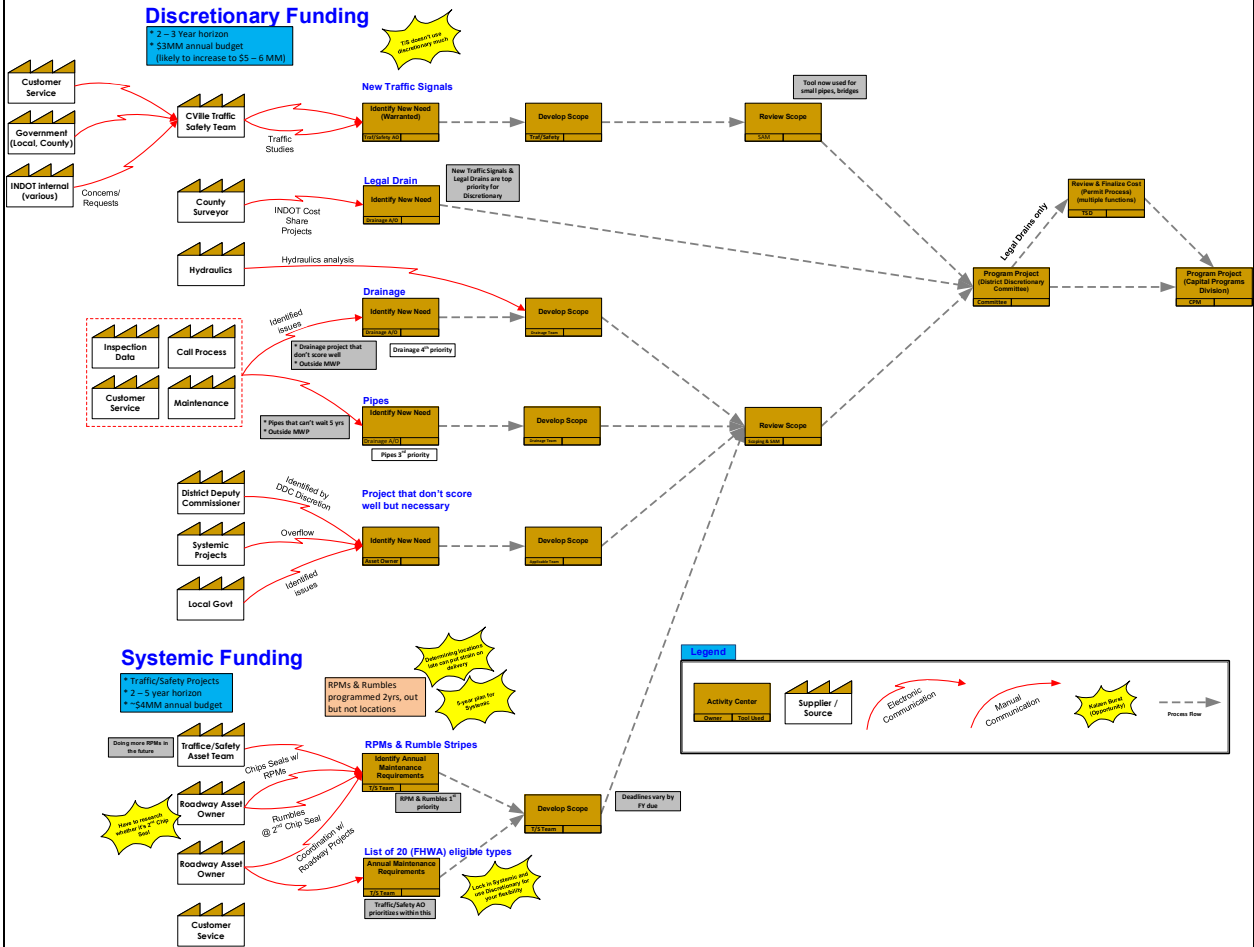
\* Traffic/Safety Projects  
 \* 2-5 year horizon  
 \* \$4MM annual budget



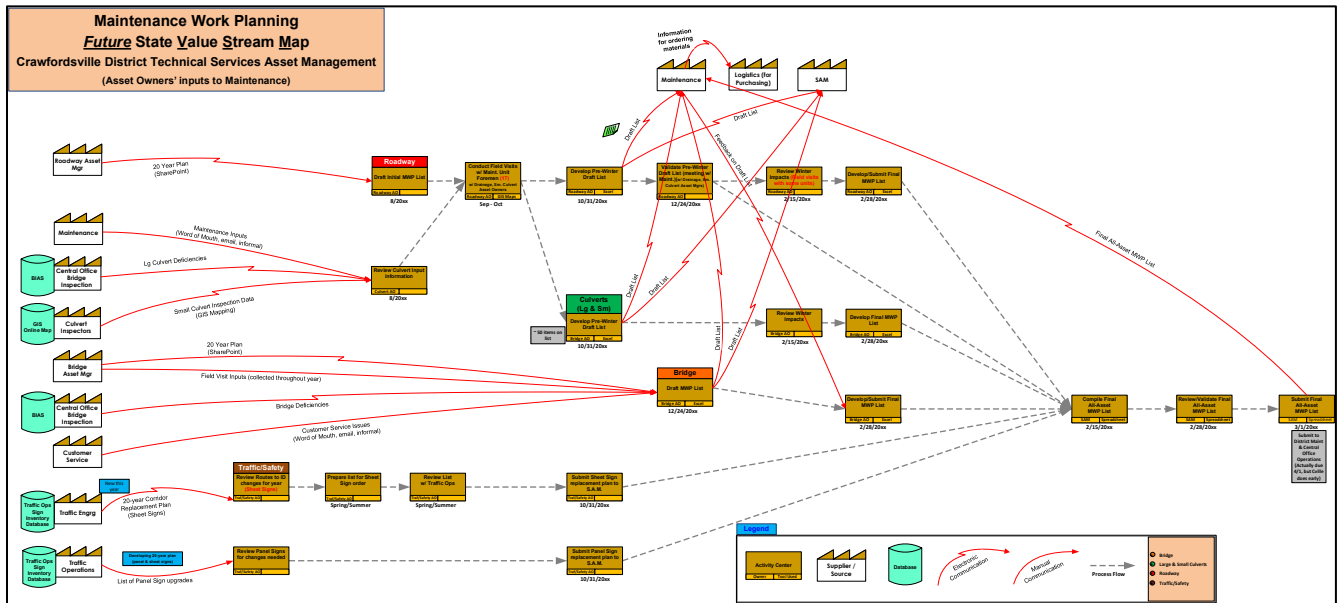
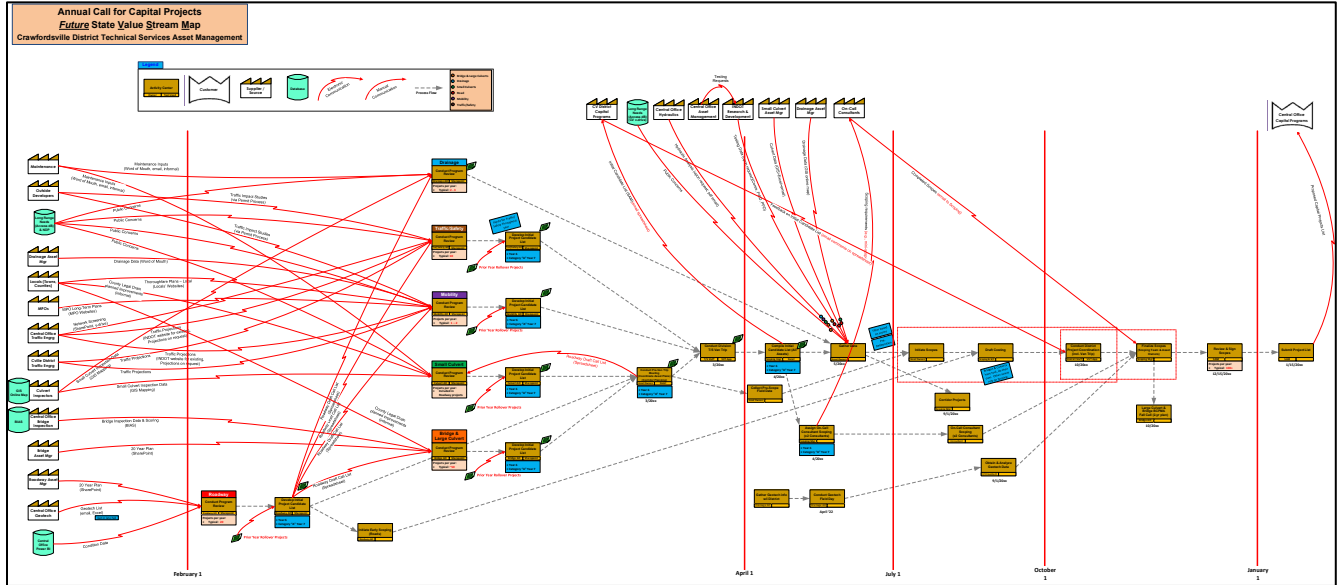
# APPENDIX B. CURRENT STATE VALUE STREAM MAPS WITH KAIZEN BURSTS



**Discretionary & Systemic Projects**  
**Current State Value Stream Map**  
 Crawfordsville District Technical Services Asset Management



# APPENDIX C. FUTURE STATE VALUE STREAM MAPS



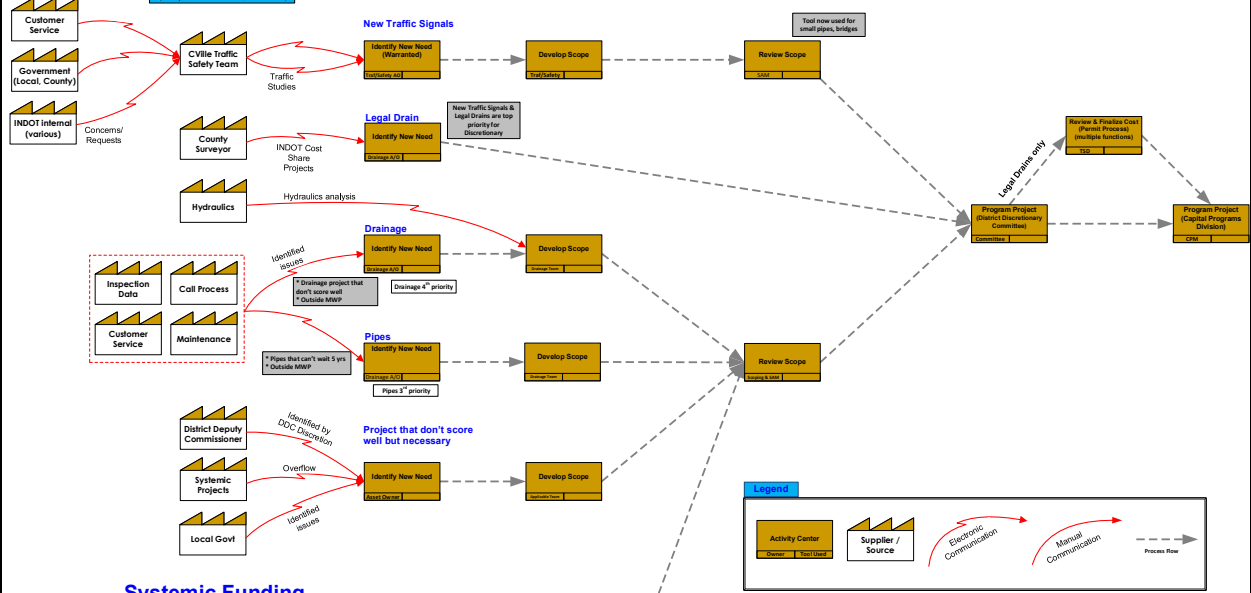
# Discretionary & Systemic Projects

## Future State Value Stream Map

### Crawfordsville District Technical Services Asset Management

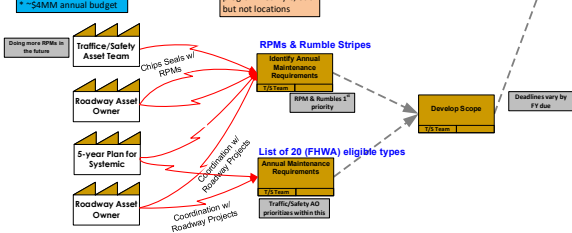
#### Discretionary Funding

\* 2-3 Year horizon  
 \* \$3MM annual budget  
 (likely to increase to \$5-6 MM)



#### Systemic Funding

\* Traffic/Safety Projects  
 \* 2-5 year horizon  
 \* \$4MM annual budget





## About the Joint Transportation Research Program (JTRP)

On March 11, 1937, the Indiana Legislature passed an act which authorized the Indiana State Highway Commission to cooperate with and assist Purdue University in developing the best methods of improving and maintaining the highways of the state and the respective counties thereof. That collaborative effort was called the Joint Highway Research Project (JHRP). In 1997 the collaborative venture was renamed as the Joint Transportation Research Program (JTRP) to reflect the state and national efforts to integrate the management and operation of various transportation modes.

The first studies of JHRP were concerned with Test Road No. 1 — evaluation of the weathering characteristics of stabilized materials. After World War II, the JHRP program grew substantially and was regularly producing technical reports. Over 1,600 technical reports are now available, published as part of the JHRP and subsequently JTRP collaborative venture between Purdue University and what is now the Indiana Department of Transportation.

Free online access to all reports is provided through a unique collaboration between JTRP and Purdue Libraries. These are available at <http://docs.lib.purdue.edu/jtrp>.

Further information about JTRP and its current research program is available at <http://www.purdue.edu/jtrp>.

## About This Report

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