

# PRODUCTIVITY & FREQUENCY STANDARDS REVIEW



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# OUTLINE

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Turnpike Fast Facts

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Background

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Investigation

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Findings

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Recommendations

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# **PA Turnpike: Fast Facts**

# FAST FACTS



## Length of Turnpike

- 552 miles
- 2,424 lane miles
- 2,725 snow lane miles



## Infrastructure

- 17 service plazas
- 22 maintenance sections
- 5 tunnels
- 12 major bridges
- 68 fare collection facilities



## History & Usage

- Commission formed May 21, 1937
- 530,000 vehicles per day
- 194 million vehicles per year

# COVERAGE AREA

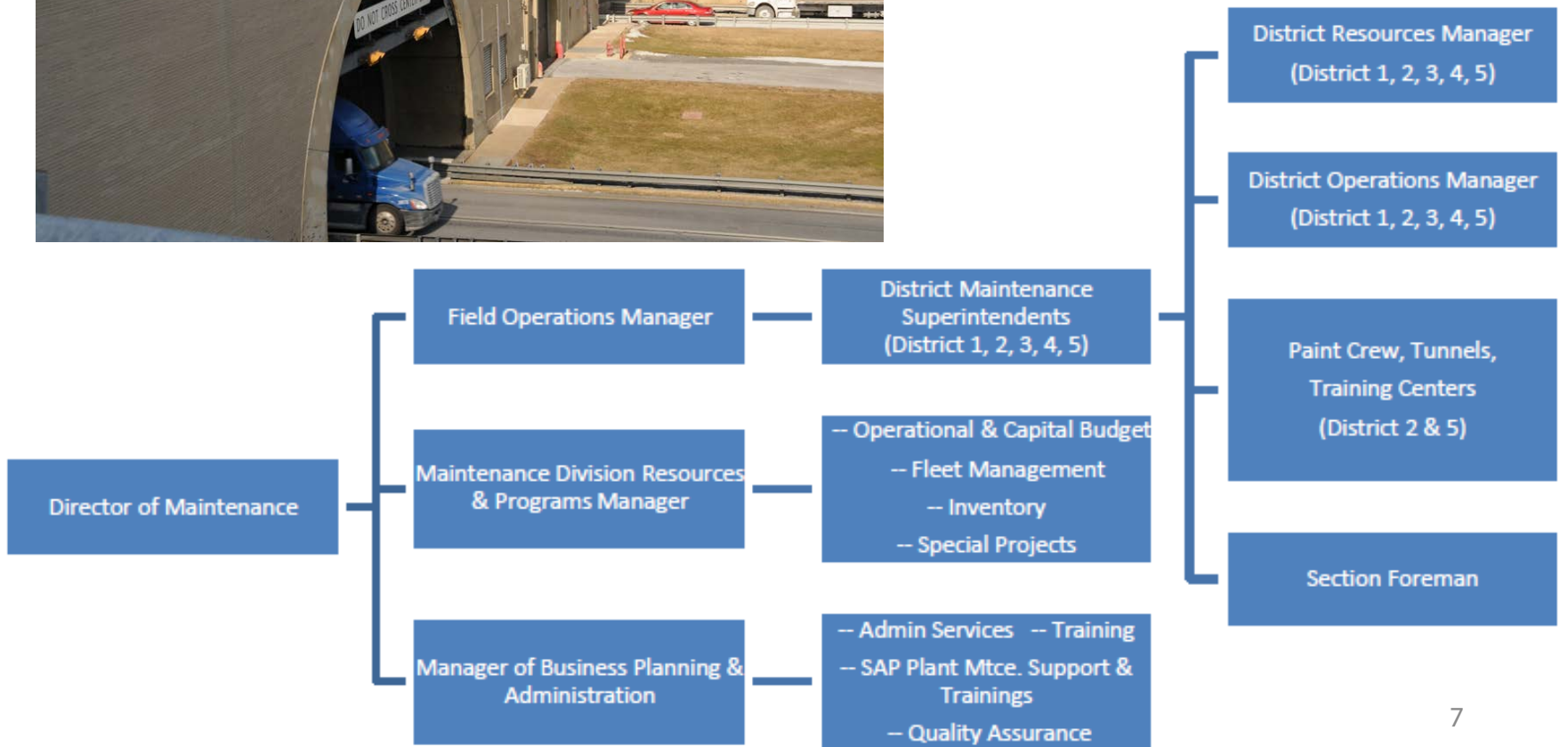
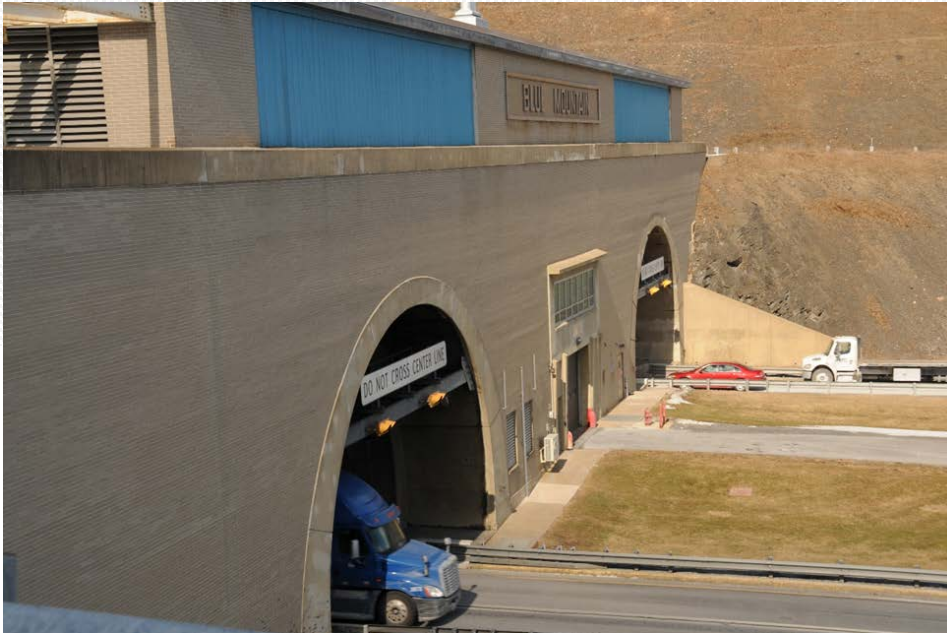




**Background**



# BACKGROUND



# BACKGROUND

- <2000 maintenance activities were not tracked with computer software
- 2000 - PTC developed the Service Order Management System (SOMS)
- 2008 - PTC transitioned to using Systems Analysis and Program Development (SAP)
- 2013 - Linear Asset Management system (LAM) was added to SAP
- 2013 – Maintenance and Foreman's Manual developed







# **Investigation**

# SCOPE



The PTC requested that Michael Baker International (Baker) research, develop and recommend *productivity* and *frequency* standards for the following PTC maintenance activities:

1. Joint Sealing
2. Cleaning Drainage Inlets
3. Sweeping (Median/Shoulder only)
4. Delineation
5. Line Painting
6. Mowing

# RESEARCH

## DAILY REPORT

Monday, April 27th, 2015

0757 Accident/Blockage T262E PTC#1504006438  
PSP#T05039941

The Operations Center received a report of an accident blocking the left lane at the above location. Maintenance, PSP, ASP and emergency services responded to the scene. Maintenance arrived confirming left lane blockage, vehicle overturned, no injury. All lanes opened at 0840 hrs. No backlog developed. ITS activated. (NK/TF/DC)

1013 Maintenance Pattern Backlog A35.1N PTC#1504006465

Due to a maintenance pattern from A35.1-A37.7 northbound, left lane for **joint dealing**, a backlog developed. Maintenance monitored the backlog which reached 31.7N at the furthest point. Backlog cleared at 1219 hrs. All lanes opened ITS activated. (NK/TF/DC)

1655 Disabled/Blocking T166.9W PTC#1504006577

The Operations Center received a report of a disabled truck blocking the right lane at the above location. Maintenance, PSP and ASP responded to the scene. All lanes opened at 1720 hrs, no backlog developed. ITS activated. (NK/TF/DC)

[Home](#) / [Local News](#)

## Gov. Wolf signs medical marijuana legalization bill into law

*Pennsylvania launches US' 24th medical marijuana program*

UPDATED 4:19 PM EDT Apr 17, 2016



# RESEARCH

Baker researched processes from the Federal Highway Administration (FHWA), National Cooperative Highway Research Program (NCHRP), American Association of State Highway and Transportation Officials (AASHTO), the New Jersey Turnpike Authority and the Ohio Turnpike and Infrastructure Commission and other agencies.



# BENCHMARKING - Line Striping

Organization	Production Unit	Labor	Equipment	Cycle
New Jersey Turnpike	4.5 lane miles/hour	1 Supervisor 3 line-strippers	1 Line striping truck	Once per year
PennDOT	8 lane miles/hour	1 Foreman 2 Gun operators 2 Equipment operators	1 PU truck 1 Paint truck 1 Supply truck	2 times per year (interstates)

Note: New Jersey applies 6" lines, PennDOT applies 4"



# BENCHMARKING – Joint Sealing

Organization	Production Unit	Labor	Equipment	Cycle
NCHRP Synthesis 98	Gallons/day or lane miles	-	-	Ave. frequency 3.6 years
PennDOT	1.0 lane miles/day	1 Foreman, 2 Equipment operators, 5 Laborers	1 Crew cab truck, 1 Dump truck, 1 Tar Kettle, 1 Air compressor, 1 Power brush, 1 Vertical router	As needed after inspection
Alabama DOT	1.4 lane miles/day	1 Crew leader, 2 Cleaning, 3 Sealing, 1 Truck driver 2 Flagmen	2 Pickups, 1 Air compressor, 1 Flatbed truck, 1 Tar Kettle, router, brush, blower	As needed after inspection
Indiana DOT	2-4 lane miles/day	1 Supervisor, 1 Flagman, 1 Pickup operator, 1 Air compressor operator, 1 Tar Kettle operator, 1 Truck driver, 1 Laborer	1 Pickup, 1 Tar Kettle, 1 Dump truck, 1 Crew cab truck	As needed after inspection

# BENCHMARKING-Delineation

Organization	Production Unit	Labor	Equipment	Cycle
New Jersey Turnpike	6 per hour	1 Supervisor, 2 Maintenance personnel	1 Pickup, 1 Post pounder, tools as required	Annually.
Utah DOT	60 to 80 per hour	2 People	1-One ton dually truck	As needed.

Utah has post mounted delineation.

New Jersey data is for inlet post delineation.

# BENCHMARKING – Mowing

Organization	Production Unit	Labor	Equipment	Cycle
New Jersey Turnpike	0.25 acres/hour	1 Maintenance person per unit	1 Crew cab truck, 1 Toro mower, Tools as required	1 cycle every 20 days
Utah DOT	2.5 acres/hour	1 Roadway Operations Coordinator, 1 Transportation Tech II	1 One ton dually, 1 70 Hp Tractor, 1 Rotary mower	Annually
Minnesota DOT	Detailed vegetation management plan that uses herbicides and special plantings along with mowing		Maintain grass height of 4-12" in median and 8' beyond shoulder in urban areas; 4-8" in medians and 8' beyond shoulder in rural areas	

# PTC MAINTENANCE MANUAL

## Work Scheduling Calendar

Work Activity	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Manual Patch	X	X	X	X	O	O					O	X
Manual Patch Emergency	O	O	O	O	O	O	O	O	O	O	O	O
Tunnel	O	O	O	O	O	O	O	O	O	O	O	O
Spray Patch	X	X	X	X	O	O					O	X
Spot Mill	X	X	X	O	O					O	X	X
Base Repair	X	X	X	X	O							X
Crack Sealing				X	X	O				O	X	X
Recycling	X	X	X	O							O	X
Spall Repair	X	X	X	X	O	O				O	X	X
Shoulder Stabilization	O	O	O	X	X	X				X	X	X
Drainage – Cleaning	O	O	O	O	O	O	O	O	O	O	O	O
Drainage – Repairs	X	X	X	X	X	X	O	O	O	X	X	X
Sidedozing	X			X	X	X	O			O	X	X
Restoration – Disaster	O	O	O	O	O	O	O	O	O	O	O	O
Storm Patrol	O	O	O	O	O	O	O	O	O	O	O	O
Graffiti	X	X	X	X	X	O				O	X	X
Interchange Cleaning	X										O	X
Tower Access Roads	O	O	O	O	O	O	O	O	O	O	O	O
Mowing	X	X	X	O	O						O	X

X = Period of Expected Performance    O = Periods of Possible Performance

Blank = Periods When Activity Usually Should Not Be Scheduled



# FOREMANS MANUAL

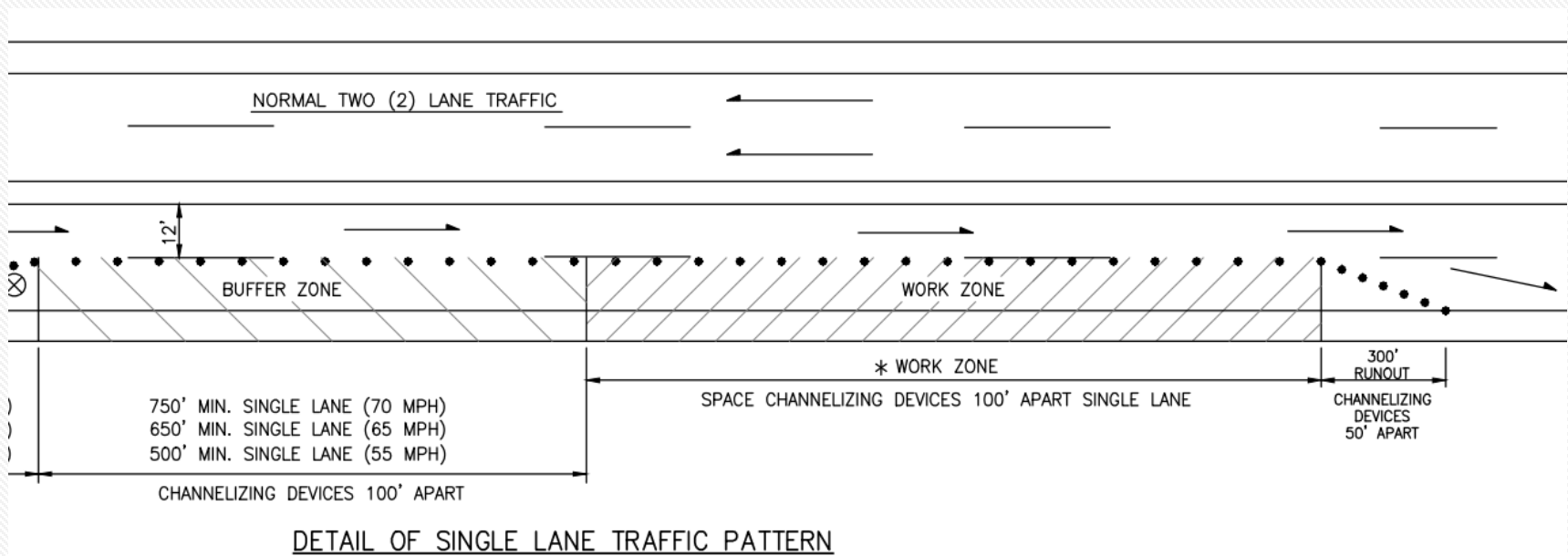
<b>Work Activity No</b>	<b>1205</b>	<b>Effective Date</b>	
<b>Work Activity</b>	<b>SLNG – Bituminous Road, Sealing</b>		
<b>Work Activity Description Summary</b>	<p>This activity includes all actions related to crack sealing bituminous surfaces with pre-packaged material.</p> <p>This activity also includes cleaning of cracks, applying material, and squeegeeing on rigid or flexible base roads. The objective of this operation is to prevent more serious pavement distress such as base failures or potholes.</p> <p>Crack sealing should be performed when the pavement temperature is above 40 degrees.</p> <p>Environmental concerns such as wetlands, erosion control, and waterway pollution are to be considered in the disposal of excavated and waste materials. Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization. Reference PTC Maintenance Field Guide for Erosion and Sediment Controls Manual.</p> <p>Reference Index of Standards for Maintenance and Protection of Traffic, PTS-920 and PTS-930.</p> <p>Reference to PTC Maintenance Manual, Chapter 6.</p>		
<b>Production Standard</b>	2.5 Lane Miles		
<b>Production Unit</b>	Lane Miles	<b>Production Unit/Hours</b>	0.031 Lane miles per hour
		<b>Planning Units</b>	Lane Miles



# FOREMANS MANUAL

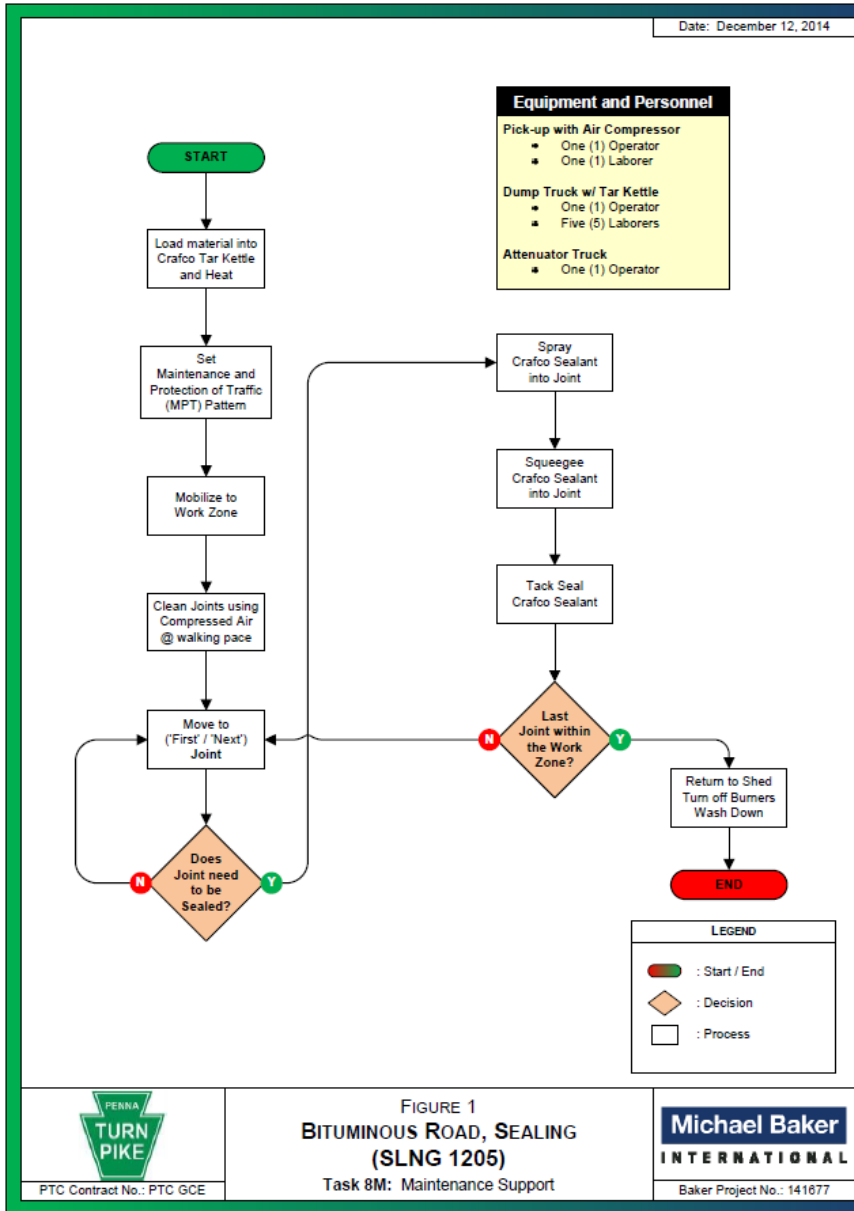
Work Activity Requirements						
Personnel		Equipment		Small Equipment	Material	
Classification	Qty.	Type	Qty.	Type	Description	Qty.
Foreman or Asst. Foreman	1	Dump Truck	3-12	Squeegee	Joint Sealant	
EO T, EO 2, EO 1,	9-13	- Joint Sealer	1	Sprayer	Detack	
		- Arrowboard	1-2			
		- Attenuator	1-3			
		- Message Board	0-3			
		- Light Plant	0-2			
		Sign Truck	1			
		Crew Cab (1-ton)	1			
		Air Compressor	1			
		- Air Compressor	1			
		Pickup Truck w/ Message Board	0-2			
The number of employees and pieces of equipment can be adjusted based on field conditions. NOTE: The numbers shown above are for a nighttime two-lane closure which would be for the maximum number required.						
Methods & Procedures						
Prior to the beginning of work, the Foreman will give the required safety talk and provide general instructions to the work crew on the daily activities.						
The Operations Center should be notified of the direction and milepost of the work zone prior to beginning of work and upon completion.						

# PTS 900 – M&P of T



- \* 5. ESTABLISH SINGLE LANE TRAFFIC PATTERN ONLY DURING ACTIVE WORK PERIODS. SHORTEN LENGTH OF SINGLE LANE PATTERN TO ONLY THE LENGTH NEEDED FOR THE MAINTENANCE OPERATION. **WORK ZONE SHOULD NOT EXCEED THREE (3) MILES IN LENGTH.** WORK ZONE IN EXCESS OF 3 MILES REQUIRES APPROVAL OF DIRECTOR OF MAINTENANCE.

# ACTIVITY MAPPING



PTC Contract No.: PTC GCE

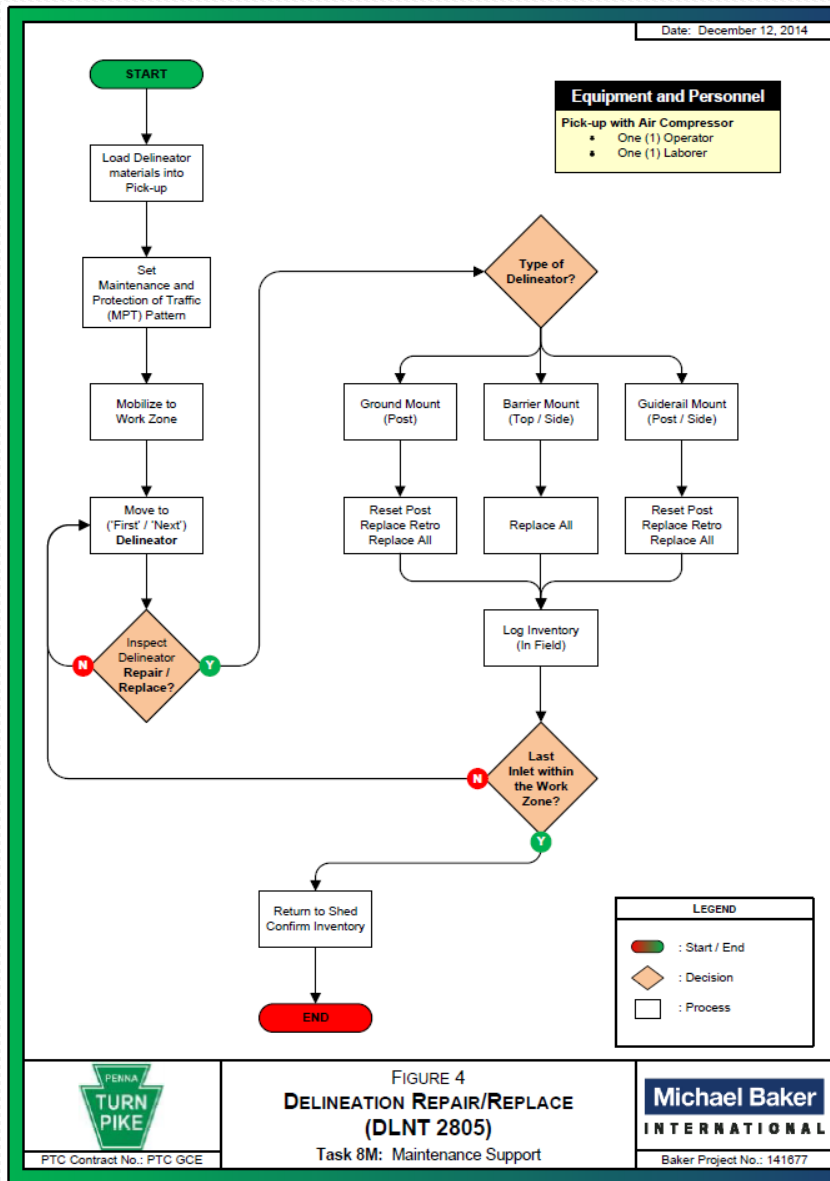
FIGURE 1  
**BITUMINOUS ROAD, SEALING (SLNG 1205)**  
 Task 8M: Maintenance Support



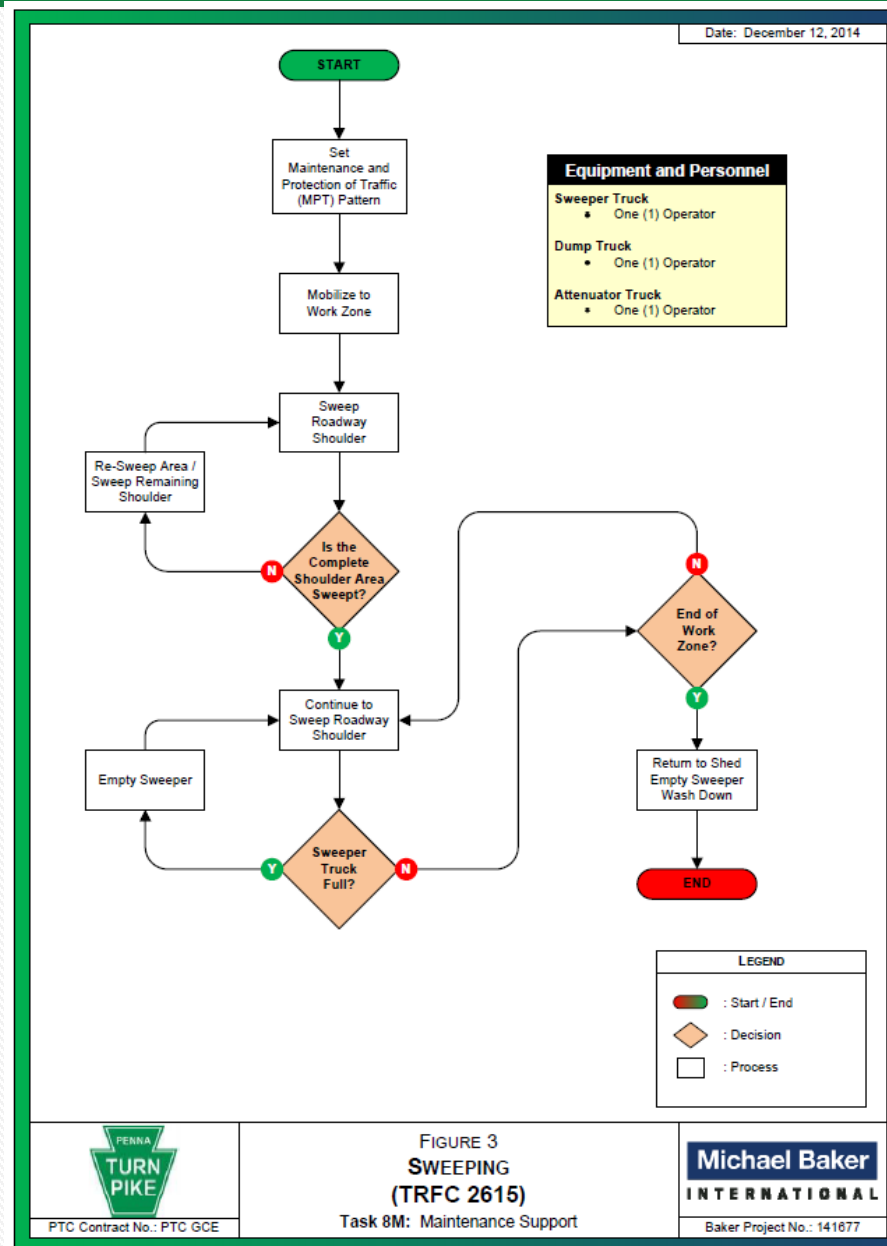
Baker Project No.: 141677



# ACTIVITY MAPPING

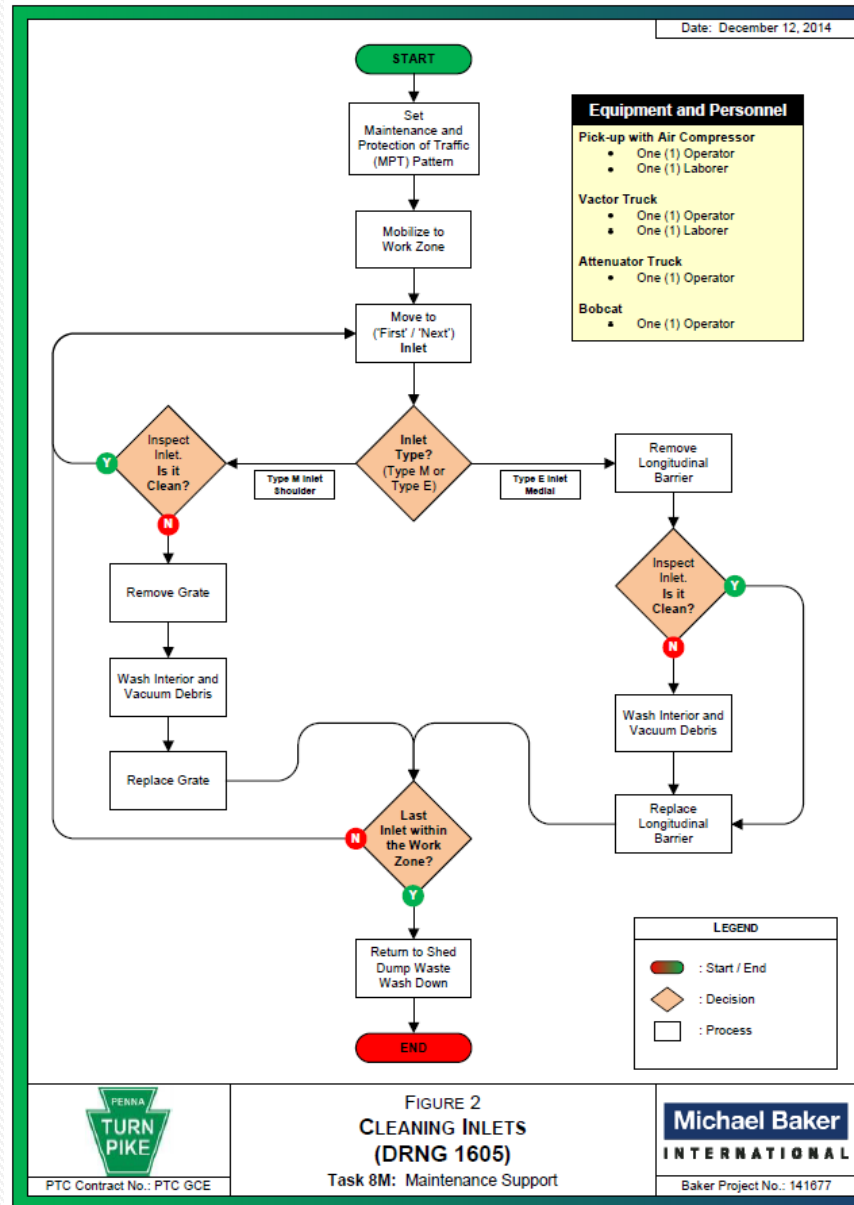


# ACTIVITY MAPPING





# ACTIVITY MAPPING





# **FINDINGS**

# JOINT SEALING

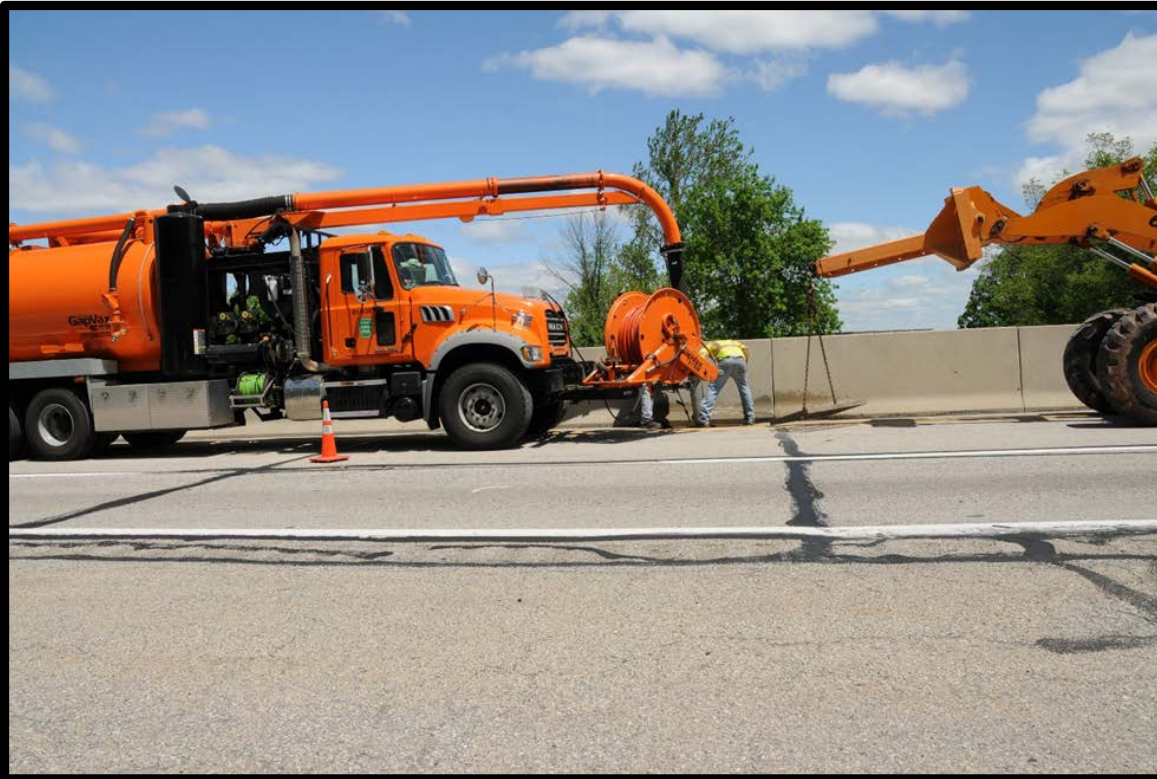
	District 2		District 5		Foreman's Manual	Benchmark
	Observed	Actual	Observed	Actual		
Productivity (Lane miles/day)	1*	2.4	1.5	3.6	2.5	2 to 4
Frequency (years)	-	1	-	1	1	3.6

\*Only 1 mile was performed due to an incident.



# CLEAN INLETS

	District 2		District 5		Foreman's Manual	Benchmark
	Observed	Actual	Observed	Actual		
<b>Productivity (# of drains per day)</b>	12	30	12	40	9	29
<b>Frequency (years)</b>	-	1	-	1		1 / As needed



# SWEEPING

	District 2		District 5		Foreman's Manual	Benchmark
	Observed	Actual	Observed	Actual		
Productivity (miles/day)	3	5.3	NA*	7.4	3	NA
Frequency (years)	-	1	-	1		1

\* Sweeper truck only did interchange and not mainline during observations.



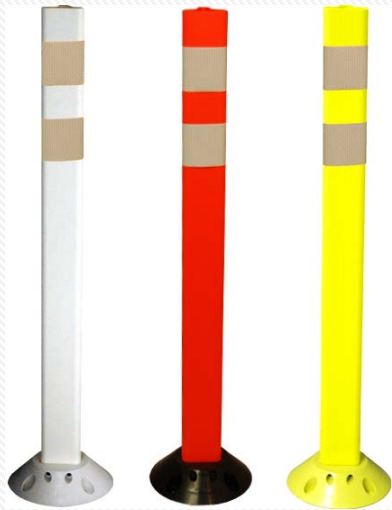


# DELINEATION

	District 2		District 5		Foreman's Manual	Benchmark
	Observed	Actual	Observed	Actual		
Productivity (miles/day)	1.8	4.1	NA*	5.9	3	70 units/hour**
Frequency (years)	-	1	-	1		1 / As needed

\* This activity was not field viewed in District 5

\*\* No data is available based on miles per day



# LINE PAINTING

	District 2		District 5		Foreman's Manual	Benchmark
	Observed	Actual	Observed	Actual		
Productivity (miles/day)	NA*	38.6	NA*	35.5	50	40-60
Frequency (years)	-	2	-	2	1	1

\* This activity was not field viewed





# MOWING

	District 2		District 5		Foreman's Manual	Benchmark
	Observed	Actual	Observed	Actual		
<b>Productivity (ROW miles/day)</b>	NA*	3.0	NA*	2.6	2.5	2.0
<b>Frequency (times/years)</b>	-	3	-	3	3	3

\* - This activity was not field viewed





# RECOMMENDATIONS

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- No changes to the current PTC procedures are recommended regarding *joint sealing* practices. Maintenance forces shall continue to inspect and joint seal on an annual basis. The Foreman's Manual should be updated to include language that specifically describes the joint sealing procedure as "annual inspection and sealing, as needed".
- Remove 3 mile work zone restriction for *joint sealing* to allow a 4 mile work zone set up for joint sealing only. PTS drawings should be updated as necessary to reflect this change.
- Revise Production Standard to 30 drains per day in the Foreman's Manual for *Cleaning Drainage Inlets* – work code 1605.

# RECOMMENDATIONS

- Revise Foreman's Manual to indicate a Production Rate of 6 miles per day for medial *sweeping* operations and 3 miles for shoulder operations.
- Revise Foreman's Manual to indicate a Production Rate of 6 miles per day for medial *delineation* operations and 3 miles for shoulder operations.
- Revise Production Standard to 40 miles per day for mainline *line painting* – work code 3220.
- No changes to the productivity or frequency are recommended for *mowing* operations.





# QUESTIONS?

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