

Public Works and Engineering Department's Lean Six Sigma Project

GREEN BELT CERTIFICATION

CLOSURE OF SKIN PATCH WORK ORDERS WITHOUT REPAIRS PERFORMED



11/10/15

PROJECT DETAILS

- Department
- Division
- Section
- Background
- Project Summary





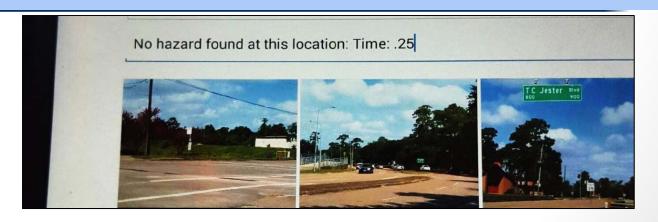
SIX SIGMA – DMAIC METHODOLOGY

Identify the problem Define Gather voice of the customer and voice of the business Finalize project focus and define project scope Collect business data Measure Determine process performance Validate business opportunity Conduct root cause analysis Analyze Quantify opportunity Prioritize root causes Develop potential solutions **Improve** Develop evaluation criteria and select best solution Evaluate risks Monitor and adjust Control Gains captured and sustained Gains made via standardization



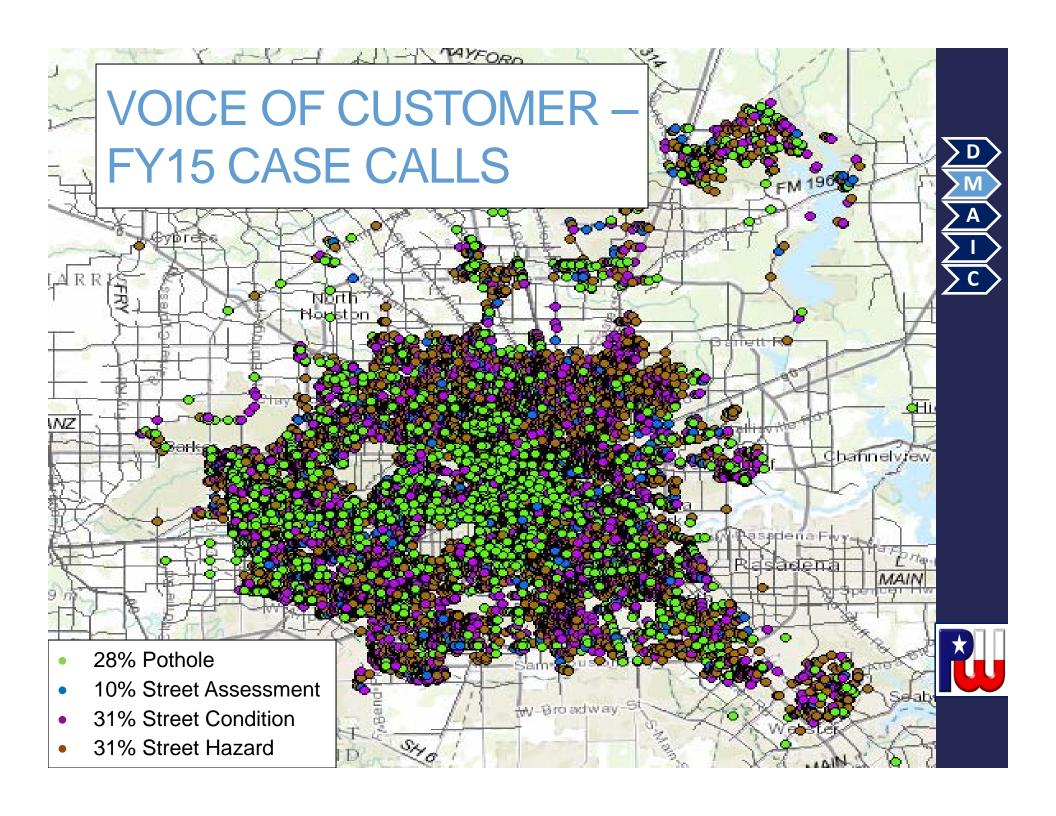
PROBLEM & MISSION STATEMENT

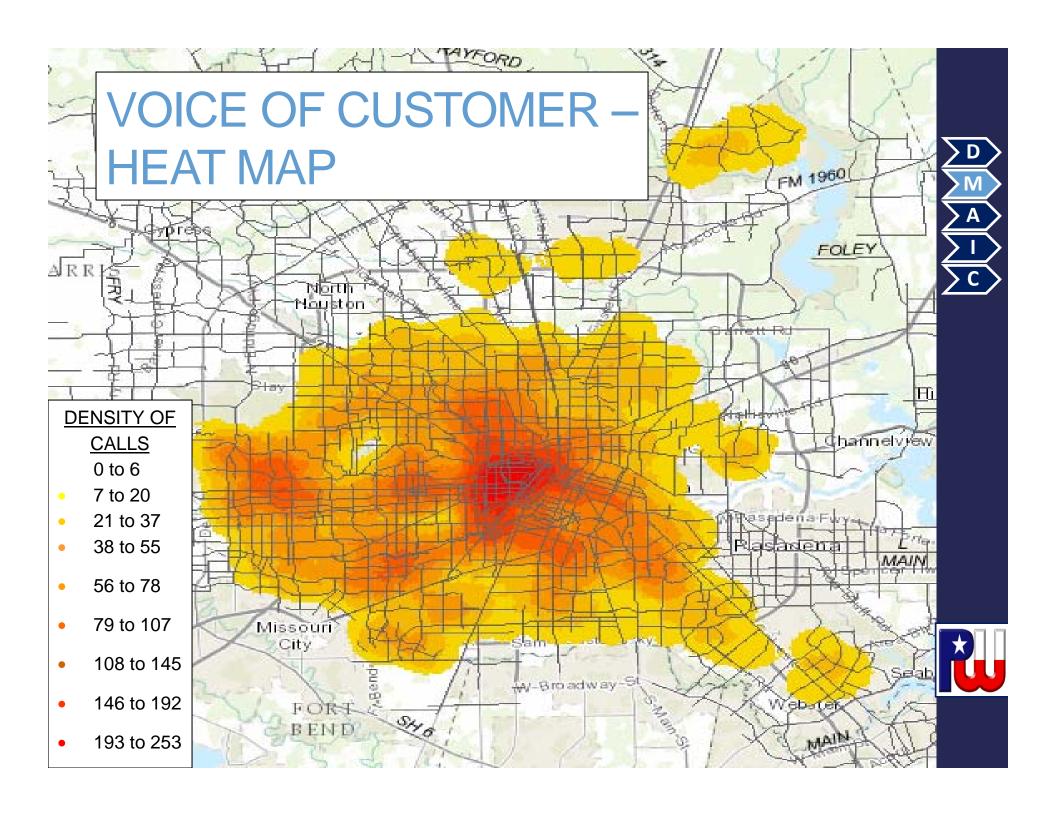
- Problem Statement In FY15, approximately 45% of skin patch work orders were assigned, visited by repair crews, and closed without repairs performed.
- Mission Statement Reduce the volume of skin patch work orders that are closed without repairs performed by half.











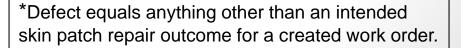
BASELINE MEASUREMENTS



Total FY15 Work Orders 14,897

FY15 Total Defect Work Orders 6,733

- -FY15 Average time wasted traveling to a bad location: Appx. 15 mins.
- -FY15 Average number of people on a crew: 5
- -FY15 Average times per day by crew (trips resulting in no materials used): 2
- -FY15 Average salary per employee: **\$12.55**
- -FY15 Average equipment cost per work order \$165
- -FY15 Estimated Annual labor cost (of dispatching crews to locations that do not require materials) : **\$480K**
- -FY15 Estimated Annual equipment costs (of dispatching equipment to locations that do not require materials): **\$1.1M**





GEMBA WALK – Crew Labor & Equipment Observation





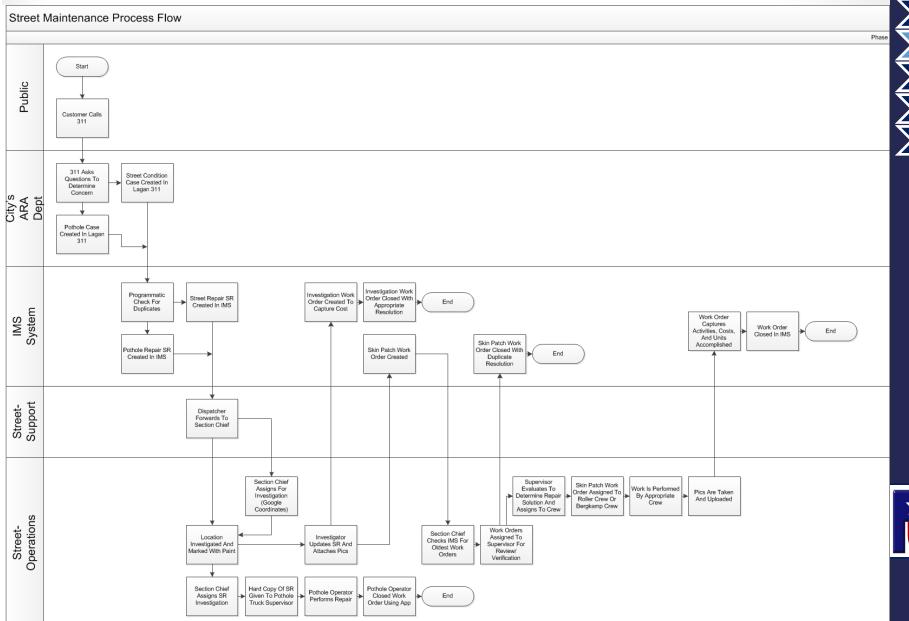








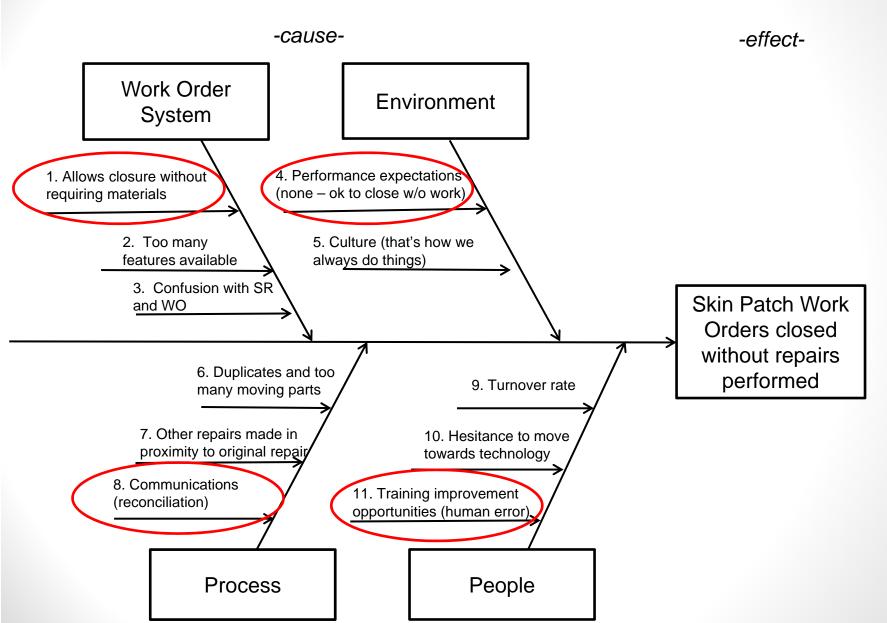
PROCESS MAPPING - SWIM LANE







ROOT CAUSE ANALYSIS - FISHBONE

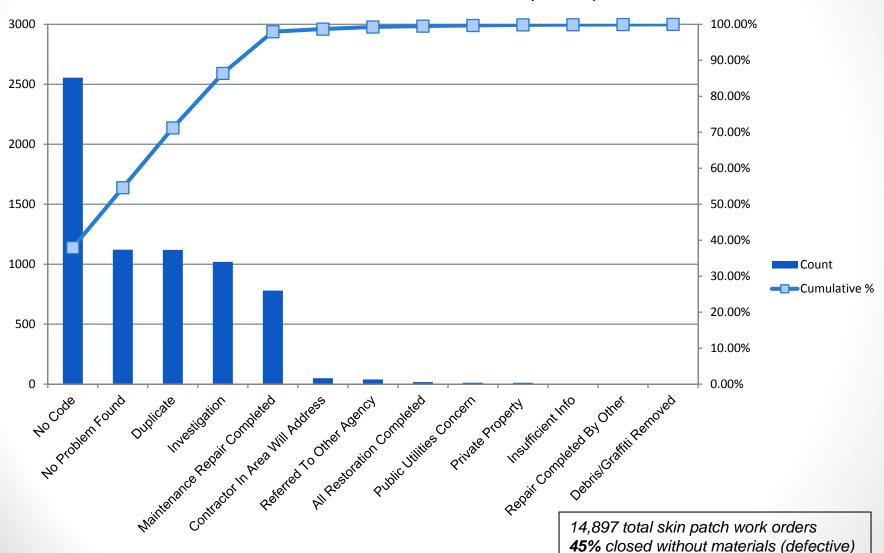






ROOT CAUSE ANALYSIS - PARETO

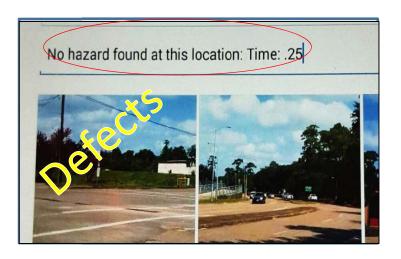








PRIMARY WASTES IDENTIFIED











RECOMMENDATIONS



assessed.



	Problems	Recommendations	Potential Benefits			
Defects	 (Top 3 defects from our Root Cause Analysis – Pareto Chart) Work Orders are being Closed without work performed and without a "resolution code" (without a reason). Work Orders are being closed without work performed due to "resolution code - no problem found". Work Orders are being closed without work performed due to "resolution code - duplicate". 	Create a control within the IMS CityWorks Work Order System that will require the "resolution code" field to be entered before closing a work order. (Elimination — 1 st preferred Mistake Proofing) Implement a step in the service request investigation process where the investigator will mark the area needed for repair. (Prevention — 3 rd preferred Mistake Proofing)	Reduce the volume of work orders closed without work performed and eliminate without a reason noted. Reduce work orders closed without work performed due to no problem found.			
Motion	Two to Six employees per work crew visiting work order locations without performing repairs	Re-send an investigator to the work order location before deploying a repair crew (when work order is over a certain amount of days outstanding). (Prevention – 3 rd Mistake Proofing)	Reduce motion waste by decreasing the number of employees visiting a work order site that may not result in a repair.			
ansportation	5. Equipment deployed with repair crew to the work order location (Pick-up Truck, Asphalt Patch truck, Dump Truck, Roller, etc)	Re-send an investigator to the work order location before deploying a repair crew (when work order is over a certain amount of days outstanding). (Prevention – 3 rd Mistake	Reduce transportation waste by only deploying repair crews for long outstanding work orders after they have been re-			

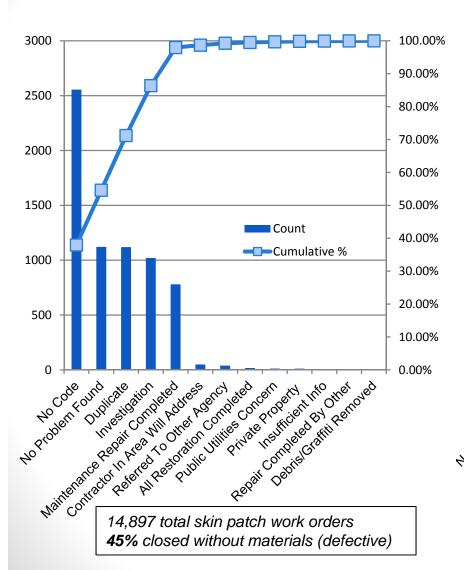
Proofing)

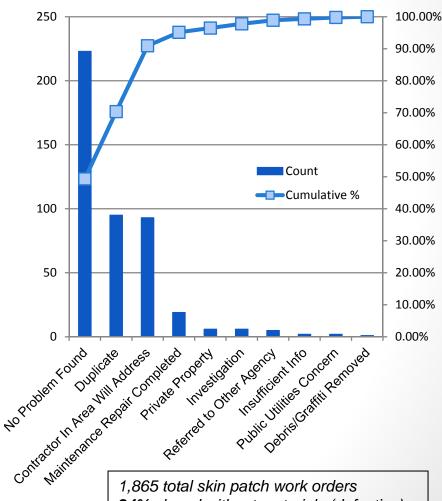




IMPROVEMENTS - PARETO

Defective Resolutions (FY 15 v. FY16 Q1)





24% closed without materials (defective)





FAILURE MODES AND EFFECTS ANALYSIS (FMEA)

Process Step: Skin Patch Repaired and Related WO Processed and Closed

Responsible Party: PWE's Street and Drainage Division

SEV = How severe is effect on the customer/Citizen?

OCC = How frequent is the cause likely to occur?

DET = How probable is detection of cause?

RPN = Risk priority number in order to rank concerns; calculated as <u>SEV</u> x

OCC x DET

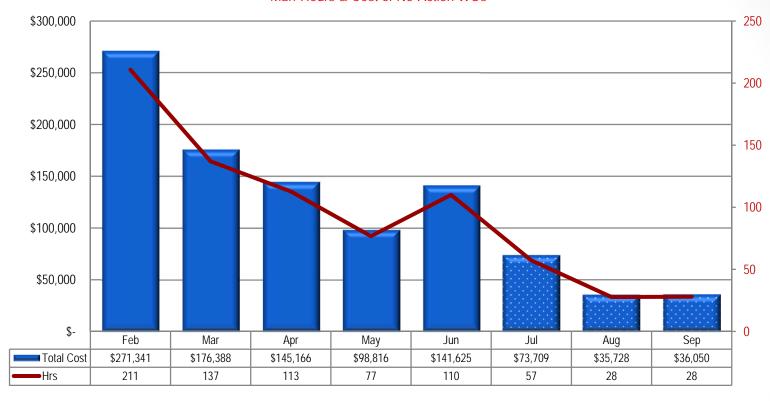
Process Step	Potential Failure Mode	Potential Failure Effects	S E V	Potential Causes	0 C C	Current Process Controls	D E T	R P N	Actions Recommended	Responsible Party	Actions Taken	S E V	0 C C	D E T	R P N
Skin Patch WO Properly Processed or Closed	closed with no code	required work did not occur and requires another call from citizen	10	carelessness and no resolution code requirement	5	resolution code now a requirement before closure	10	500	consider consolidating or making clearer resolution codes	PWE's Street/ Drainage Division	suggest to management that resolution codes be reviewed	8	5	8	320
	no problem found	effort to create WO wasted and requires another call from citizen	8	lack of training and repair previously performed	4	employees close out WO when they arrive to site where all appears to be fine	8	256	consider system requirement for pics to be attached before WO closure	PWE's Street/ Drainage Division	suggest to management that pics or video be attached for no problem found	6	4	6	144
	duplicate	effort to create WO wasted and two teams go to same location for repair	6	lack of screening and no attention to detail	3	new technology assists with minimizing duplicates	6	108	consider further technology investment to eliminate duplicates	PWE's Street/ Drainage Division	suggest to management to consider improved technology	4	3	4	48





LEAN SIX SIGMA RESULTS

Man-Hours & Cost of No-Action WOs

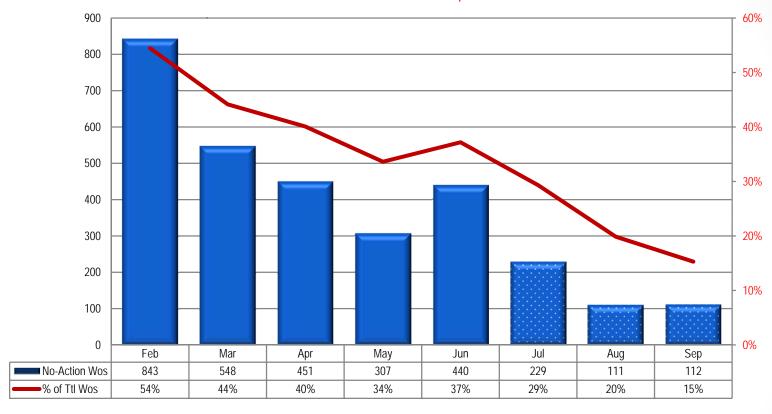


- From Feb June, no-action work orders cost the division \$833,336
- In FY16 Q1, no-action work orders cost the division \$145,487
- In FY15, work orders closed without repair resulted in wasted labor and equipment cost estimated at \$1.5M. With implementation of the lean six sigma project recommendations discussed, both labor and equipment waste will be reduced significantly in FY16.



LEAN SIX SIGMA RESULTS





- In FY15, approximately 45% of work-orders required no repairs. For the period of the LSS project (Jul-Sep), that ratio fell to 24%.
- At the peak of the Pothole Emergency (Feb), 54% of work-orders in the Division's inventory were found to require no repairs. **The Division had less than 16% for Oct!**





Questions & Answers

