Appendix C

Operations Management System (OMS) Data Analysis



OMS Data Presentation - Summary of Meetings

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FROM:	Gary Sharpe Project Manager for District 4 Palmer Engineering	dary W. Sharpe
DATE:	June 12, 2018	

SUBJECT: KYTC District 4 Accessibility and Connectivity Studies Meeting with Section Engineers and Maintenance Foremen

As a part of the existing data review process, Operations Management System (OMS) data was provided by KYTC for the 11 counties within District 4 with the objective of identifying persistent maintenance issues on major corridors. The original spreadsheet from KYTC had 19,150 individual maintenance activities (rows of data) for District 4 between January 2012 and July 2017.

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To identify problem areas, these 19,150 activities were grouped by county in Microsoft Excel and each route within that county was then copied to an individual sheet. The route sheets were then sorted by From Point, and then To Point (the corridor milepoints). A calculated column, "Length," was added to each sheet to determine the length of the segment, based upon the milepoints.

Segments were then determined based upon contiguous and consistent high-cost repairs; therefore, the segments are of varying length. Once each segment was identified, the total cost for the segment, the cost per mile within the segment, and the percentage that segment's cost represents of the total corridor cost, were calculated.

Segment data was imported into ArcGIS and further refined if warranted (e.g., segments may have been combined or separated based on visual relationship). Mapping was created for each county, with segments categorized according to the following cost-per-mile thresholds: Less than \$10,000; \$10,000 - \$25,000; \$25,000 - \$50,000; \$50,000 - \$75,000; and Greater than \$75,000. Within each map, the segments with a cost per mile of \$10,000 or



greater were placed on the map with an accompanying flag or tabulation to identify the following information for each segment:

- Route number
- Milepoints of the high-cost segment
- Cost per mile within the segment
- Percentage of the corridor's total maintenance cost represented by the segment

The next step was to organize individual meetings with Section Engineers and maintenance staff from each of the District 4 counties to discuss the identified roadway segments and any other corridors with potential recurring maintenance issues. The goal of the meetings was to solicit input from the maintenance staff to compare to the results of the data-driven OMS analysis. The meetings were organized by Section, with two or three counties represented in each meeting, and according to the following format:

- 1. The group addressed each county in their Section, one county at a time.
- 2. The staff was given an 11"x17" map for each county, with each high-cost segment identified as described above.
- 3. Palmer staff took notes regarding the areas from the OMS data maps that the Section staff commented on. Those comments included temporary repairs that resulted in high expenditures and permanent repairs that resolved the issue leading to high costs, from the staff's perspective. *Not every flagged area was discussed.
- 4. A large-scale road map for each county was provided as well, and Section staff were requested to mark their high-priority areas on that map. Palmer staff noted the comments and concerns associated with each area marked and described. Those areas have been added to the summary tables and mapping below and identified as not being reflected in the OMS data when applicable.

The 11 county meetings are summarized below. The attached maps are updated versions of what was shown in the Section meetings. Feedback from the county staff has been added and color-coded to correspond with the tables below; flagged OMS data which was not discussed in the meetings is still denoted on each map for reference.



Meade, Grayson, and Breckinridge Counties

Hardinsburg Section Office Westview, Kentucky May 16, 2018 @ 9:30 A.M. EDT

Meade County

During the discussion about the Meade County OMS data analysis results, **two** of the flagged segments were confirmed as problem areas with resolutions in progress or complete. Section staff confirmed that **nine** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. An additional **five** areas of concern, which were not flagged by the OMS data, were identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 823	Shoulder repairs	Resolution in progress	Yes	\$12,297	\$12,297
US 60 (MP 0.0 - 1.0)	Cross drain repair / patch	Resolved	Yes	\$13,520	\$13,520
KY 1919	Contract patch / pavement resurfacing	Ongoing	Yes	\$50,382	\$12,315
KY 1158	Inadequate base – shingle asphalt	Ongoing	Yes	\$37,399	\$10,692
KY 228 (MP 0.0 – 2.0, multiple locations)	Slide area	Ongoing	Yes	\$35,336	\$17,668
KY 1047	Slide area	Ongoing	Yes	\$57,582	\$26,535
KY 376	Slide area	Ongoing	Yes	\$26,265	\$26,265
KY 228 (MP 21.0 – 23.812)	Base failure repair	Ongoing	Yes	\$129,032	\$45,886
KY 710	Cross drains	Ongoing	Yes	\$46,048	\$39,123
KY 933 (MP 3.0 – 4.0)	Slide repair	Ongoing	Yes	\$23,807	\$23,807
KY 933 (MP 5.0 – 6.0)	Mill and repair / pavement shoving	Ongoing	Yes	\$14,889	\$14,889
KY 376 / KY 144	Slide area	Ongoing	No	NA	NA
KY 144 / County Road	Sight distance problem	Ongoing	No	NA	NA
KY 1238	Base repairs	Ongoing	No	NA	NA



Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 144	Pavement failure issues; drainage problems; sinkhole	Ongoing	No	NA	NA
KY 230	Slide area	Ongoing	No	NA	NA



Grayson County

During the discussion about the Grayson County OMS data analysis results, **one** of the flagged segments was confirmed as a problem area that has been resolved. Section staff confirmed that **five** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. An additional **six** areas of concern, which were not flagged by the OMS data, were identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 2193 (MP 0.0 – 1.0)	Replaced pipe	Resolved	Yes	\$29,105	\$29,105
KY 185 (MP 0.0 – 5.0)	Patching / resurfacing High water issues identified during meeting	Ongoing	Yes	\$156,958	\$31,392
KY 2067	Contract patching	Ongoing	Yes	\$26,246	\$72,906
KY 54 (MP 3.0 – 4.0) (MP 7.0 – 8.0)	No Shoulder, run-off-road accidents	Ongoing - would like project – possibly HSIP	Yes	\$37,719 \$31,930	\$37,719 \$31,930
KY 259 South (Bear Creek)	Slide area	Ongoing	Yes	\$208,774	\$52,194
US 62	Patching – recurring draining concern	Ongoing	No	NA	NA
KY 920	Continuous guardrail repair	Ongoing	No	NA	NA
KY 878	High water issues	Ongoing	No	NA	NA
KY 920 (at bridge)	Low guardrail / slide	Ongoing	No	NA	NA
KY 88 (two locations)	Bridge end settlement	Ongoing	No	NA	NA
US 62	Drainage issues / patching	Ongoing	No	NA	NA



Breckinridge County

During the discussion about the Breckinridge County OMS data analysis results, no flagged segments were described as being resolved. Section staff confirmed that **eleven** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. An additional **six** areas of concern, which were not flagged by the OMS data, were identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 144 (MP 1.0 – 4.0)	Slide repair	Ongoing	Yes	\$215,334	\$71,778
KY 144 (MP 9.0 – 10.0)	Slide repair	Ongoing	Yes	\$59,893	\$59,893
KY 629	Curvy road – Macedonia Church	Ongoing	Yes	\$32,180	\$32,180
KY 1616	Inadequate base - recycled shingles	Ongoing	Yes	\$71,262	\$55,63 0
KY 1073 (MP 0.0 – 5.0)	Narrow shoulders	Ongoing	Yes	\$163,603	\$32,721
KY 1073 (MP 5.0 – 7.861)	Narrow shoulders	Ongoing	Yes	\$108,148	\$37,801
KY 690	Narrow shoulders	Ongoing	Yes	\$90,130	\$18,241
KY 886	Contract patching – Master Agreement	Ongoing	Yes	\$178,792	\$76,146
KY 261 (MP 23.0 – 24.0)	Contract patching – Master Agreement	Ongoing	Yes	\$104,450	\$104,450
KY 333 / KY 690	Intersection sight distance problem	Ongoing	Yes	\$21,717	\$21,717
KY 105	Slide repair	Ongoing	Yes	\$231,832	\$12,637
KY 992	Drainage issues (multiple locations)	Ongoing	No	NA	NA



Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 259 / KY 401	Drainage issues – freeze / thaw – pothole patching	Ongoing	No	NA	NA
KY 108	Pothole patching	Ongoing	No	NA	NA
KY 1238	Drainage issues	Ongoing	No	NA	NA
KY 108 / KY 105	Slide repair	Ongoing	No	NA	NA
KY 261 - Dodge Creek	Low water ford – new bridge, alignment	Ongoing	No	NA	NA



Hardin and Hart Counties

District 4 Bridges Conference Room Elizabethtown, Kentucky May 16, 2018 @ 1:30 P.M. EDT

Hardin County

During the discussion about the Hardin County OMS data analysis results, **seven** of the flagged segments were confirmed as problem areas with resolutions in progress or complete. Section staff confirmed that **eight** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. An additional **four** areas of concern, which were not flagged by the OMS data, were identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
I-65 (MP 101.0 - 103.38)	Addressed by rehab project	Resolved	Yes	\$489,851	\$212,240
KY 2199	Patching / resurfacing	Resolved	Yes	\$18,536	\$54,517
KY 1600	Pipe replacement	Resolved	Yes	\$40,579	\$40,579
KY 1500	Sight distance issue	Resolved	Yes	\$97,203	\$39,258
KY 1357	Pipe replacement	Resolved	Yes	\$78,705	\$78,705
KY 1904	Pavement issues	Resolved	Yes	\$46,825	\$46,825
KY 567	Slide area	Resolved	Yes	\$178,017	\$178,017
31W	Pavement failure (two locations)	Ongoing	Yes	\$15,298	\$15,298
KY 313 at I-65	Differential settlement	Ongoing	Yes	\$109,872	\$109,872
US 31W (Radcliffe McDonald's)	Pavement failure	Ongoing	Yes	\$10,620	\$10,62 0
I-65 (MP 90.0 – 98.0)	Cable barrier / guardrail	Ongoing	Yes	\$280,221	\$35,028
KY 251	Pavement failure	Ongoing	Yes	\$124,897	\$31,224
KY 434 (US 31W to KY 251)	Base failure – shoulder widening	Ongoing	Yes	\$78,120	\$26,040
US 31W (near Westpoint)	Mainline paving – narrow shoulders	Ongoing	Yes	\$256,8 10	\$62,272



Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
US 31W	Pavement structure upgrade	Ongoing	Yes	\$25,094	\$12,547
KY 313	Slides; 2:1 cut slopes	Ongoing	No	NA	NA
KY 86	Pavement patching; pipe failure	Ongoing	No	NA	NA
KY 361	Shoulders, pavement issues	Ongoing	No	NA	NA
Ring Road	Bridge end stabilization	Ongoing	No	NA	NA



Hart County

During the discussion about the Hart County OMS data analysis results, **nine** of the flagged segments were confirmed as problem areas with resolutions in progress or complete. Section staff confirmed that **seven** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. An additional **four** areas of concern, which were not flagged by the OMS data, were identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 1140	Pipe replacement / resurface	Resolved	Yes	\$263,809	\$52,762
KY 728 (MP 11.0 – 16.0)	Resurfacing project	Resolved	Yes	\$166,934	\$33,387
KY 1015	Slope failure	Resolved	Yes	\$144,376	\$93,812
US 31W (MP 1.0 – 2.0)	Patching	Resolved	Yes	\$41,275	\$41,275
US 31E (MP 0.0 – 2.0; MP 4.0 – 5.0)	Patching	Resolved	Yes	\$93,510 \$42,928	\$46,755 \$42,928
KY 88 (MP 19.0 – 22.0; MP 26.0 – 27.0)	Resurfacing	Resolved	Yes	\$72,734 \$67,989	\$72,734 \$67,989
KY 1573	Sinkhole	Resolved	Yes	\$45,999	\$28,571
US 31E (MP 12.0 – 13.0)	Guardrail	Resolved	Yes	\$110,819	\$110,819
KY 2785	Pipe replacement	Resolved	Yes	\$141,683	\$49,008
KY 88 (MP 0 – 4.0) (MP 4.0 – 5.0) (MP 7.0 – 8.0) (MP 15.0 – 16.0)	Needs shoulder repairs; patching, pavement failures	Ongoing	Yes	\$167,952 \$95,117 \$17,266 \$37,049	\$41,988 \$95,117 \$17,266 \$37,049
KY 88	Rock cut	Ongoing	Yes	\$33,318	\$22,482
CY 218Rock cutCY 218Asphalt over old concrete and poor subgrade soil		Ongoing	Yes	\$35,300	\$35,300
US 31W	Sinkhole	Ongoing	Yes	\$31,719	\$31,719
KY 2756	Sinkhole	Ongoing	Yes	\$56,724	\$36,199



Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 2185	Geometry, drainage	Ongoing	Yes	\$14,775	\$14,775
KY 2786	Pavement base failure	Ongoing	Yes	\$133,672	\$33,418
KY 218 (KY 1141 to KY 1846)	Drainage issues	Ongoing	No	NA	NA
KY 728 (US 31W to KY 357)	Pavement issues	Ongoing	No	NA	NA
KY 1140	Geometry, ditching, etc.	Ongoing	No	NA	NA
US 31W	Pavement concerns (base failures)	Ongoing	No	NA	NA



Larue, Washington, and Nelson Counties

Bardstown Section Office Bardstown, Kentucky May 17, 2018 @ 9:30 A.M. EDT

Larue County

During the discussion about the Larue County OMS data analysis results, **four** of the flagged segments were confirmed as problem areas with resolutions in progress or complete. Section staff confirmed that **six** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. **One** additional area of concern, which was not flagged by the OMS data, was identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 210	Patching / milling	Resolved	Yes	\$113,661	\$56,831
KY 1906	Slope movement	Resolved	Yes	\$16,244	\$16,244
KY 916	Pipe replacement	Resolved	Yes	\$38,962	\$19,481
KY 583	Pipe replacement	Resolved	Yes	\$27,206	\$27,206
KY 583	Pavement issues – landfill	Ongoing	Yes	\$62,444	\$14,672
KY 84	Alignment – falling rock	Ongoing	Yes	\$105,331	\$28,592
KY 224	Drainage / flooding	Ongoing	Yes	\$15,059	\$15,059
KY 1618	Patching / resurfacing	Ongoing	Yes	\$18,685	\$17,577
US 31E (MP 10.232 – 11.803)	Patching	Ongoing	Yes	\$70,970	\$45,175
US 31E (MP 19.0 – 20.0)	Slide repair	Ongoing	Yes	\$140,025	\$140,025
US 31W & KY 224	Significant recurring pavement failure	Ongoing	No	NA	NA



Washington County

During the discussion about the Washington County OMS data analysis results, **one** of the flagged segments was confirmed as a problem area that has been resolved. Section staff confirmed that **four** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. No additional areas of concern were identified by Section staff.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 433	Slide repair	Resolved	Yes	\$107,639	\$107,639
KY 1754 (MP 0.0 – 3.0) (MP 3.0 – 7.985)	Drainage, alignment, geometry	Ongoing	Yes	\$86,793 \$83,998	\$28,931 \$16,850
KY 1796	Pavement issues	Ongoing	Yes	\$153,492	\$33,281
KY 438	Pipe replacement / patching	Ongoing	Yes	\$51,301	\$40,715
KY 9002	Patching / ditching	Ongoing	Yes	\$72,235	\$15,027



Nelson County

During the discussion about the Nelson County OMS data analysis results, **six** of the flagged segments were confirmed as problem areas with resolutions in progress or complete. Section staff confirmed that **five** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. **Two** additional areas of concern, which were not flagged by the OMS data, were identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
US 31	Reconstructed – maintenance of old road	Resolved	Yes	\$54,771	\$13,144
KY 458	Slide repair	Resolved	Yes	\$48,293	\$48,293
KY 46 MP 6.0 – 6.951)	Patching / resurfacing	Resolved	Yes	\$56,934	\$59,867
KY 46 (MP 7.75 – 11.16)	Patching / resurfacing	Resolved	Yes	\$46,081	\$13,513
KY 247 (MP 2.0 – 3.0)	Slide repair	Resolved	Yes	\$172,828	\$172,828
KY 52	Patching	Resolved	Yes	\$10,956	\$34,345
KY 49 (south of Parkway)	Slide repair / drainage	Ongoing	Yes	\$197,241	\$65,747
KY 84	Geometry, low shoulder, tree cutting	Ongoing	Yes	\$81,481	\$16,296
KY 55	Pavement / geometry	Ongoing	Yes	\$42,018	\$42,018
KY 1754	Geometry / shoulders; Slide repairs have been addressed	Ongoing	Yes	\$102,666	\$71,644
KY 332	Patching, resurfacing, pipe replacement	Ongoing	Yes	\$69,473	\$22,303
KY 247	Pavement issue – heavy truck traffic	Ongoing	No	NA	NA
KY 52 at US 31E	Intersection improvement	Ongoing	No	NA	NA



Green, Taylor, and Marion Counties

Campbellsville Section Office Campbellsville, Kentucky May 17, 2018 @ 1:30 P.M. EDT

Green County

During the discussion about the Green County OMS data analysis results, **three** of the flagged segments were confirmed as problem areas with resolutions in progress or complete. Section staff confirmed that **three** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. **Four** additional areas of concern, which were not flagged by the OMS data, were identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 218	Pipe extension / resurfaced	Resolved	Yes	\$170,016	\$17,853
KY 61 (MP 0.0 - 8.194)	Addressed by project	Resolved	Yes	\$147,842	\$18,043
KY 61 (MP 11.0 – 13.0)	Project planned	Being resolved	Yes	\$28,120	\$28,120
KY 569	Shoulders, alignment	Ongoing	Yes	\$24,288	\$45,398
KY 210	Guardrail	Ongoing	Yes	\$80,599	\$107,465
KY 88 (KY 61 to County Line)	Geometry, pavement, no shoulders, slides	Ongoing	Yes	\$314,519	\$28,002
KY 61 at KY 88	Slide, pavement failures	Ongoing	No	NA	NA
KY 487	Slide and utility impacts	Ongoing	No	NA	NA
KY 2765 (Old Salem Road – MP 2.0)	Pavement failure, drainage	Ongoing	No	NA	NA
KY 61 (MP 24.0)	Drainage area	Ongoing	No	NA	NA



Taylor County

During the discussion about the Taylor County OMS data analysis results, **seven** of the flagged segments were confirmed as problem areas with resolutions in progress or complete. Section staff confirmed that **three** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. **Three** additional areas of concern, which were not flagged by the OMS data, were identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 744 (MP 5.0 – 6.0)	Pipe replacement, base failure, resurfacing	Resolved	Yes	\$33,496	\$33,496
KY 2222	Patching	Resolved	Yes	\$16,218	\$31,308
KY 372	Cross drains, etc.	Resolved	Yes	\$112,049	\$31,941
KY 70	HSIP-Type Project	Resolved	Yes	\$47,3 80	\$47,380
KY 55	Bridge shoulders / guardrail; will be addressed in 2+1 project	Resolved	Yes	\$34,068	\$30,971
KY 1798	Slope and pavement; will be addressed	Resolved	Yes	\$101,912	\$19,024
KY 3350	No recurring issues	Resolved	Yes	\$19,803	\$31,890
KY 70	Slope failure	Ongoing	Yes	\$84,694	\$21,371
KY 1798	Ditching – will not be addressed with slope	Ongoing	Yes	\$101,912	\$19,024
KY 659	Slides, slope failures, pavement failures	Ongoing	Yes	\$27,628	\$27,628
US 68	Slope / shoulder failure	Ongoing	No	NA	NA
KY 744 (near Mannsville)	Slope failures	Ongoing	No	NA	NA
US 68/KY 55 (Palestine to 5-lane at Campbellsville)	Shoulder upgrade – add turning lanes	Ongoing	No	NA	NA



Marion County

During the discussion about the Marion County OMS data analysis results, **two** of the flagged segments were confirmed as problem areas with resolutions in progress or complete. Section staff confirmed that **three** of the flagged segments were ongoing issues, and they described temporary repairs or provided additional information as noted below and in the attached mapping. **Two** additional areas of concern, which were not flagged by the OMS data, were identified and described by the Section staff as noted below and in the mapping.

Roadway Name	Section Staff Comments	Status of Problem	Reflected in OMS Data?	Total Cost	Cost per Mile
KY 289	Bridge end stabilization	Resolved	Yes	\$41,735	\$20,868
KY 2154	Added pipe base stabilization; added turn lane	Resolved	Yes	\$69,431	\$51,931
KY 49 (south near Bradfordsville)	Slope failures / slides	Ongoing	Yes	\$253,727	\$126,863
KY 52	Shoulders, pavement	Ongoing	Yes	\$96,446	\$20,586
KY 84	Slides, cross drains, base failures; Prepped for resurfacing but needs additional work	Ongoing	Yes	\$123,494	\$24,699
KY 49 (3-4 miles from Casey County line)	Slope failures, slides, drain improvements, geometry	Ongoing	No	NA	NA
US 68	Bridge end stabilization	Ongoing	No	NA	NA





















