Post Construction Review

Quality Assurance Branch
Division of Highway Design

Coordinator – Jonathan West, P.E.
Partnering Conference
September 11, 2012

KENTUCKY TRANSPORTATION CABINET

Purpose

- NOT AN AUDIT !!!
- Provide constructive, informative feedback to our Design Industry
- Assist in completing the circuit between PD&P and Project Development

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Goals

- Review Four Projects per District Annually
  > $1 Million & Open to Traffic 1 year
- Facilitate Open Dialogue among Review Participants
- Provide accurate, concise Fact Sheets
- Statistical Analysis

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Communicating Results

- Issues & Solutions from Fact Sheets input into Lessons Learned Geodatabase
- Follow up meetings with Cabinet leadership
  - hot topic issues
  - based on trends
- Possible changes in Policies / Procedures, Specifications, Standards Drawings, etc.
- Quality Matters Newsletter
  issued to Designers, PD&P, National Organizations, TRB Committees

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List of Desired Participants

- Designers (Roadway, Traffic, Structures, Pavement, etc.) – project dependent
- District PD&P Representation including Inspectors, Staff Engineers, Section Supervisors
- Project Development Team
- Prime Contractor Representation
- FHWA, Local Officials, etc.

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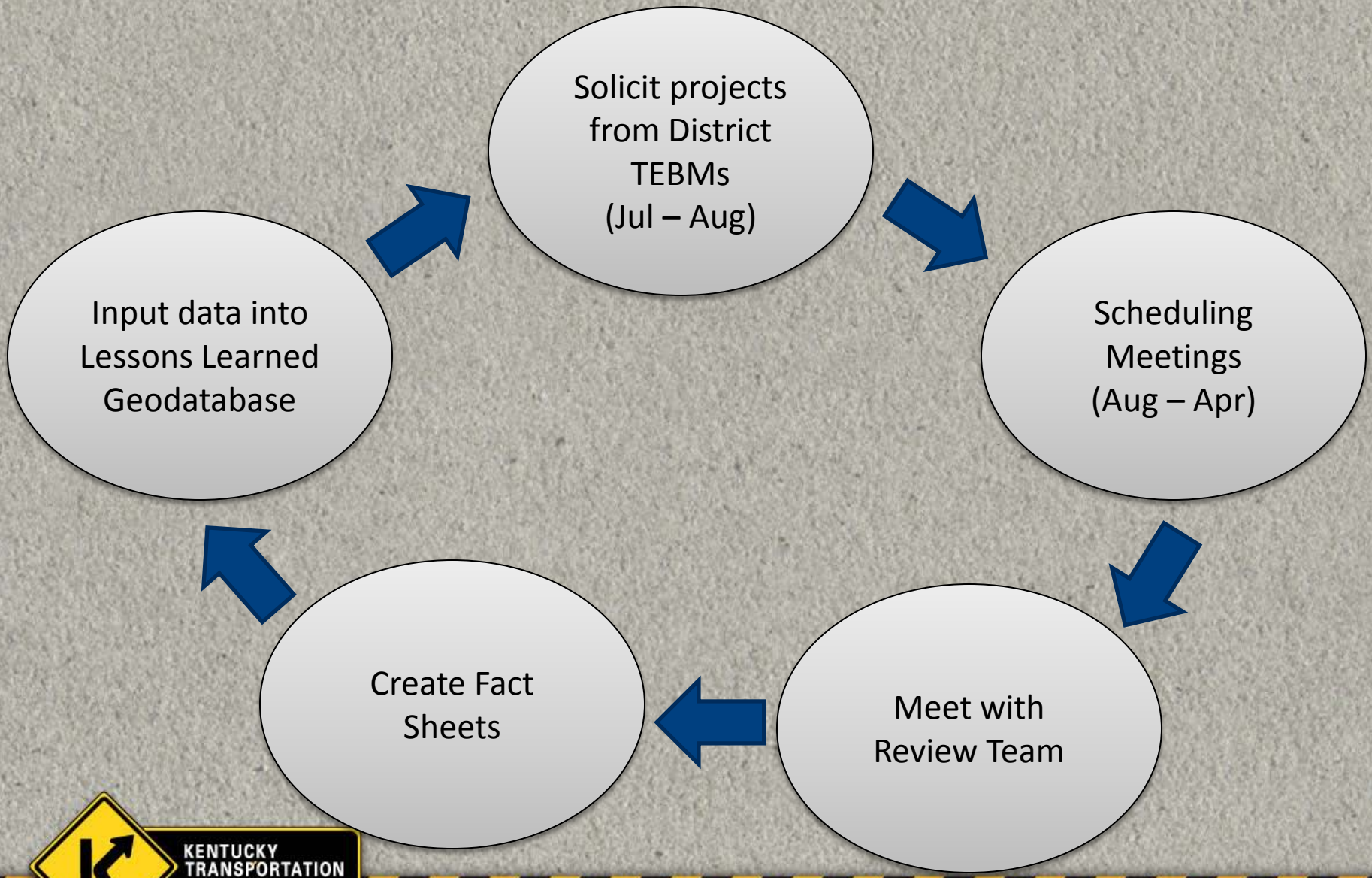
PCR Cycle



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FY13 PCR Cycle Schedule

- District 1 – September 20 & 27
- District 2 – September 25 & 26
- District 8 – October 15 & 18
- District 4 – October 23 & 24
- District 6 – November 7 & 8
- District 12 – November 14 & 15
- District 3 – December 4, 5, & 6
- District 5, 7, 9, 10, & 11 – Scheduling in Progress

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New Approaches

- Review at 90% complete stage
- Incorporate Review into Final Inspection
- Provide Districts with Project List
  - generated from Crystal Reports
  - not all inclusive
  - project selection tool

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Double Crossover Diamond Harrodsburg Road (US68) – District 7

- PCR held August 9th at District 7
- Request for PCR from Design Team & Value Engineering
- PCR's can include observing participants from Design Teams of similar projects
- Examples of Lessons Learned
  - SUE (utilities)
  - Police presence during closures
  - District Preferences (Paved Ditches, Thermo markings, etc.)

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Date of Review: 8/9/2012 **Facilitated By:** Jonathan West

Place of Review: District 7 Conference Room

General Information

Project County:	**Fayette**	Project Designer:	**Stantec**
Item Number:	**7-144.01**	Project Contractor's Name:	**L-M Asphalt Partners DBA ATS**
CID:	**111022**	Section Engineer's Name:	**Tony McGaha**
Route:	**Harrodsburg Road (US 68)**		
Project Type and Length:	**Major Widening (0.657 miles)**		
Project Description:	Construction of Double Crossover Diamond Interchange on Harrodsburg Road (US 68) at New Circle Road (KY 4)		

File Name: **P_7-144-01_Fayette_08-12.pdf**

Change Order Total:	3
Original Project Cost:	$ 5,670,646.21
Change Order Total:	$ 571,023.16
Total Amount	$ 6,241,669.37
CO % Increase:	10.07%

Attendees:

Jonathan West, KYTC, Highway Design
Nathan Wilkinson, KYTC, Highway Design
Boday Borres, KYTC, Highway Design
Bob Nunley, KYTC, Highway Design
Erica Barefield, KYTC, Highway Design
Roy Sturgill, KYTC, Highway Design
Nasby Stroop, KYTC, Construction
Lizabeth Likins, KYTC, Construction
Jeff Jasper, KYTC, Highway Design
Keith Caudill, KYTC, Highway Design
James Ballinger, KYTC, D-7, Exec Director
James Simpson, KYTC, Highway Design
Steve Farmer, KYTC, D-7, TEBM PD&P
Brian Aldridge, Stantec
Glenn Hardin, Stantec
Antonio Pousa, Stantec
Jason Bricker, Stantec
Tony McGaha, KYTC, D-7, Section Eng
Brian Billings, ATS Construction

Categories

Construction	Design
Drainage	Environmental
Erosion Control Plan (ECP)	Geotechnical
Maintenance of Traffic (MOT)	Materials
Pavement	Right-of-Way (ROW)
Structures	Traffic
Utilities	

Notes:

1 **Category:** Geotechnical **Subtopic:** Unsuitable Material

During excavation, unstable soils were encountered in many locations along the project. These areas were outside the existing footprint of US 68 and no indications of soft soils were apparent prior to excavation. Due to the restrictive construction timeline, manipulation of the soil to achieve optimum moisture was not possible; therefore, undercutting was unavoidable.

Solution:

Fabric wrapped Crushed Aggregate No. 2 stone was utilized in these areas to stabilize the subgrade. Soft soil conditions are difficult to predict until actual construction commences; therefore, change orders cannot be avoided in such situations.

LESSONS LEARNED

GIS DATABASE

Nathan Wilkinson

Partnering Conference

September 11, 2012

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Overview of

Lessons Learned Geodatabase

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Purpose of Lessons Learned Geodatabase

- Identify common problems/solutions
- Listen to ideas from Districts, Consultants, Construction, & Contractors
- Share feedback from PCR's with Designers
- Learn from past to improve future projects

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The goal of PCR is not to rehash C.O.'s or assign blame.

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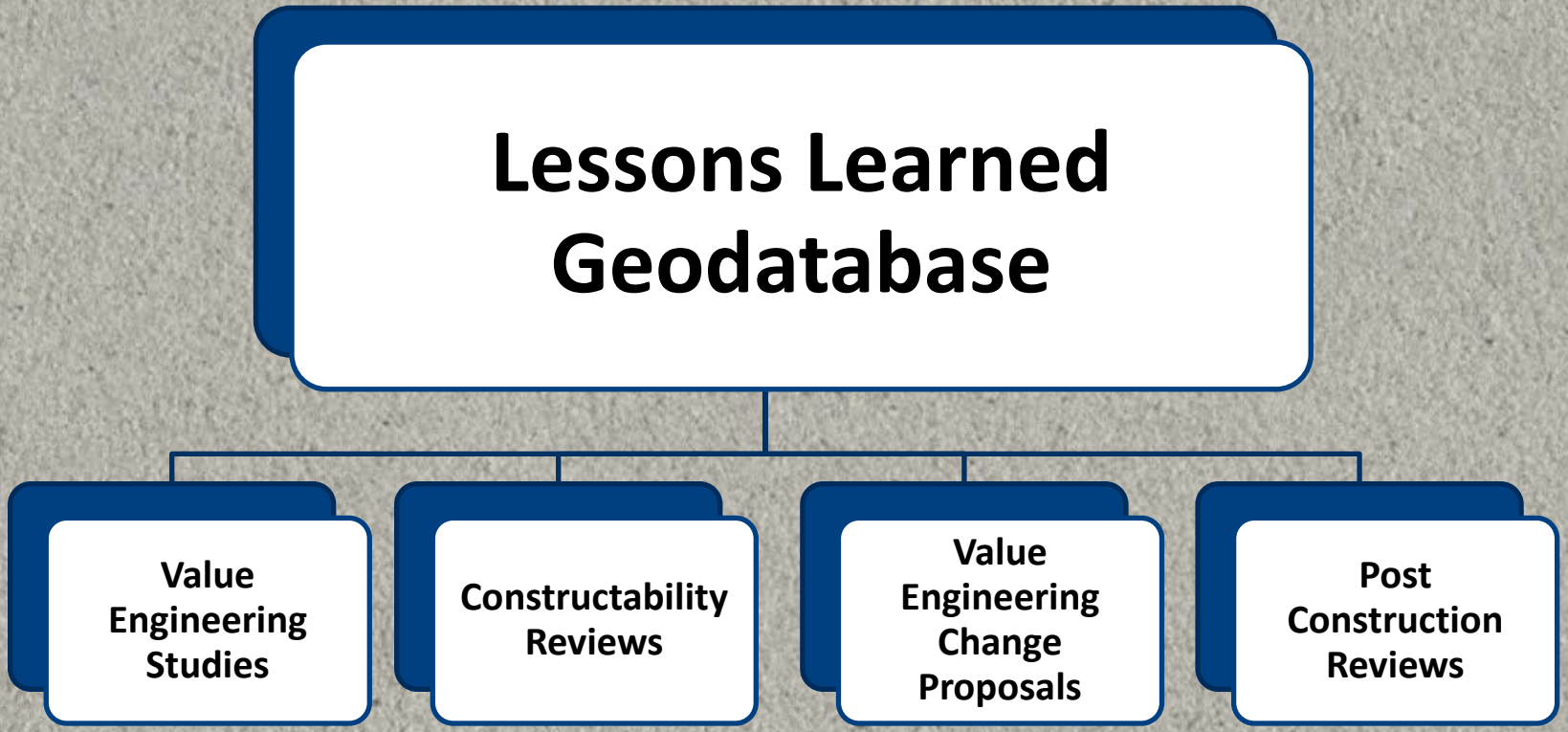
Information from Four Datasets



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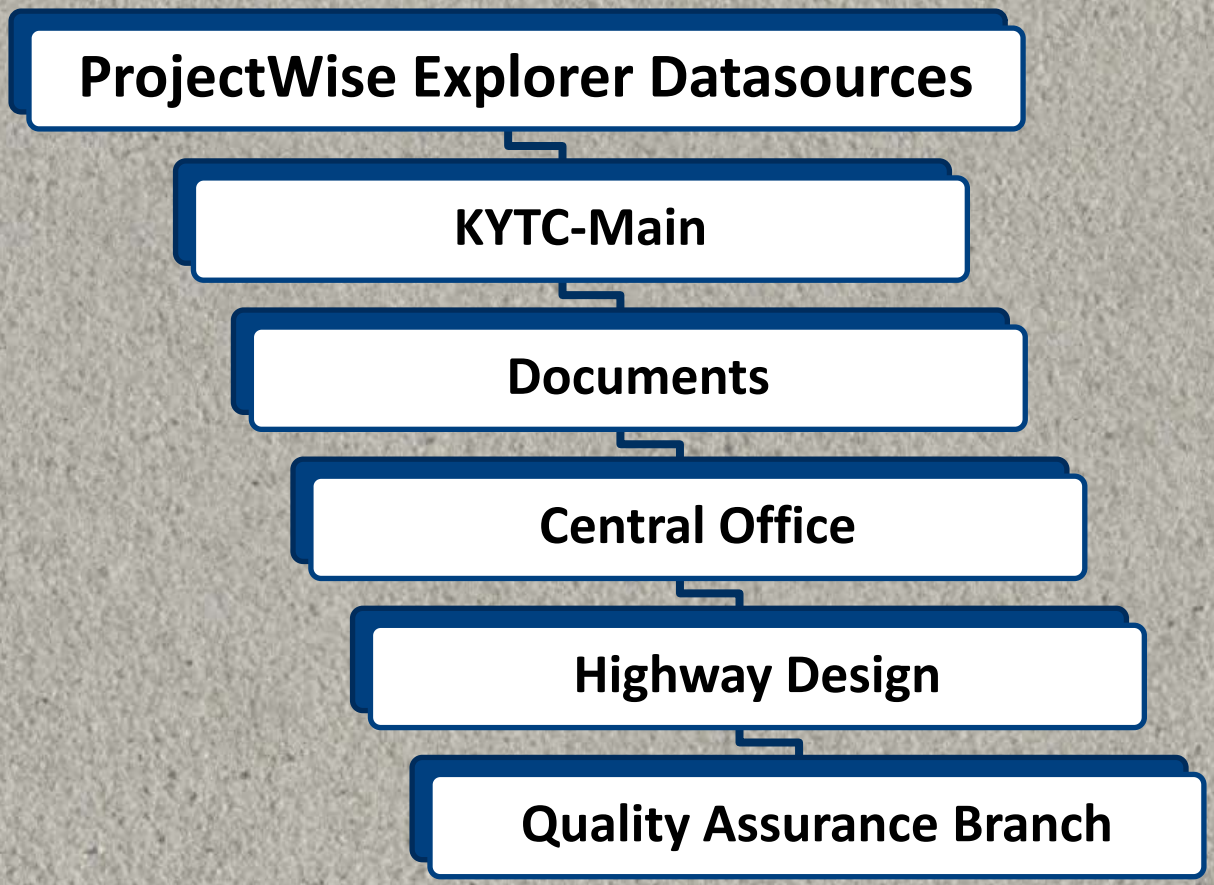
Location of these Datasets



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Mapping & data entry for all existing Post Construction Reviews complete

- Reviews (243 total)
- Over 200 data fields per project
- Key data fields include: SYP & CID Number, Designer, Contractor, # of Change Orders, Change Order Costs, Issues & Solutions

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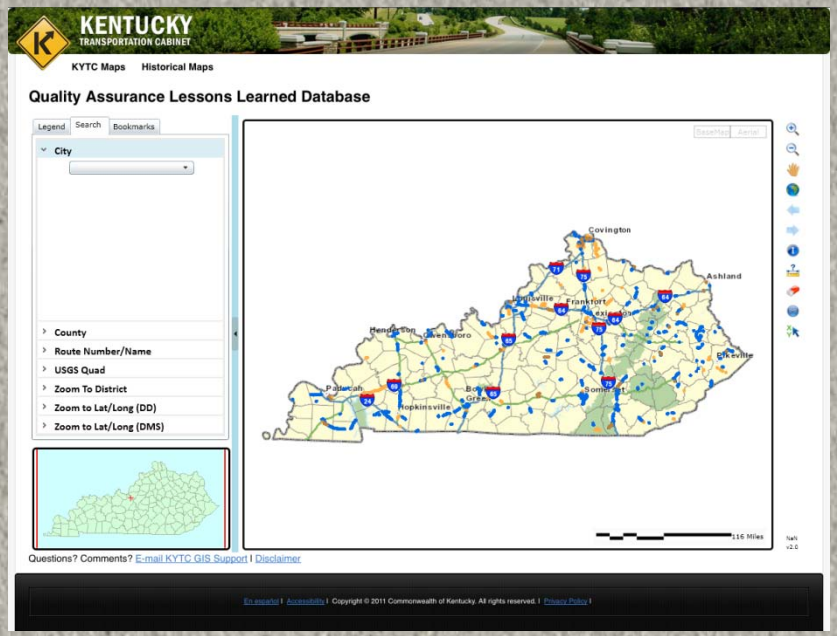
Launched ArcGIS Server Lessons Learned GIS Web Application

- URL:http://maps.kytc.ky.gov/LessonsLearnedDatabase/



Available Online at:

http://transportation.ky.gov/Highway-Design/Pages/Quality-Assurance.aspx

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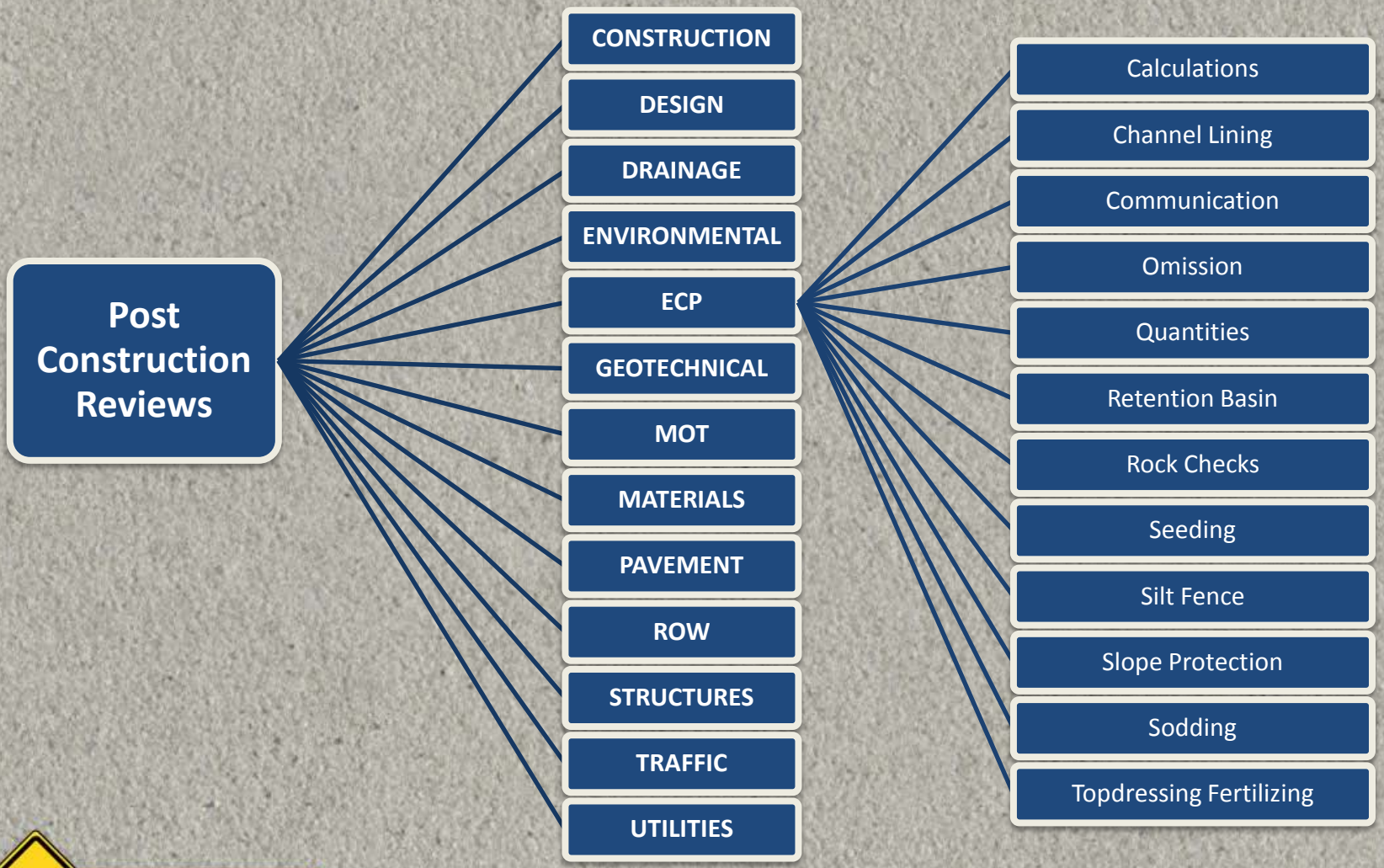
Post Construction Review Categories and Subtopics



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PCR Categories and Subtopics

CONSTRUCTION	#
Bench Marks	2
Contracts	42
Coordination	23
Delays	15
Earthwork	13
Evaluations	3
Inspection	9
Method / Innovation	1
Omission	2
Permits	2
Public Relations	9
Railroads	10
Revisions	27
Ride Quality	13
ROW	6
Rumble Strips	3
Safety	9
Specifications	8
Striping Removal	3
Subsurface	9
Temporary Fencing	8
Wells	4
TOTAL	221

DESIGN	#
Access	12
Adjacent Projects	23
Alignments	6
Borrow/Waste	23
CAP	4
Communication	17
Coordination	10
Diversion	1
Drainage	20
Elevations	7
Entrance	46
Evaluations	11
Excavation	7
Grade	9
Granular Embankment	4
Guardrail	60
Intersection	21
Lighting	2
Median	12
Omission	130
Phasing	11
Piping	4

DESIGN (Cont.)	#
Plan Processing	2
Plans	37
Quantities	87
Radius	12
Railroads	5
Relocation	6
Safety	23
Shelved Plans	16
Shoulders	10
Sight Distance	7
Slopes	13
Special Note	18
Specifications	11
Standard Drawings	2
Striping	5
Survey	5
Test Case	1
Underground Tank	5
Utility Agreements	1
Waste Areas	6
TOTAL	712

DRAINAGE	#
Berms	1
Bridge Ends	12
Coordination	5
Cross Drains	4
Culvert	12
Curb Box Inlets	2
Ditches	28
Diversion Drainage	10
Drop Box Inlets	14
Edge Drains	5
Elevation	17
Embankment Benches	1
Error	13
Existing Pipe	22
Flooding	7
Headwalls	8
Omission	78
Pipe Sizing	16
Pipes	28
Ponding	22
Quantities	17
Retention Basin	1
Sheet flow	2
Stream Mitigation	5
Temporary Drainage	16
Temporary Pipes	1
TOTAL	347

ENVIRONMENTAL	#
Archaeological Study	4
Asbestos	15
Contaminated Material	14
Landscaping	6
Pollution	5
Silt Ponds	1
Stream Mitigation	7
Underground Tank	16
Vegetation	2
Wells	10
TOTAL	80

ECP	#
Calculations	2
Channel Lining	17
Communication	4
Omission	44
Quantities	30
Retention Basin	1
Rock Checks	1
Seeding	20
Silt Checks	1
Silt Fence	13
Slope Protection	22
Sodding	5
Topdressing Fertilizing	3
TOTAL	163

GEOTECHNICAL	#
Berms	1
Coffer Dam	1
Communication	3
Cut-Slope	13
Elevations	10
Embankment Stabilization	7
Investigation	8
Karst	2
Mine	6
Omission	1
Piling/Drilled Shaft	8
Quantities	6
Safety	7
Settlement	10
Sinkhole	14
Slides	49
Soils	19
Subsurface	55
Top of Rock	24
Unsuitable Material	59
TOTAL	303

MOT	#
Changes	21
Clearances	2
Communication	7
Contract	2
Detours	11
Diversions	9
Entrances	12
Incentive	2
Lane Closures	4
Lighting	2
Moving Traffic	2
Omission	79
Part Width	3
Phasing	26
Plan	9
Quantities	33
Safety	53
Shoulders	20
Signage	16
Slides	1
Striping	20
Tie-ins	1
Timing	5
TOTAL	340

MATERIALS	#
Asphalt Mixtures	15
Backfill	5
Concrete Mix	4
Coring	1
TOTAL	25

PAVEMENT	#
Approaches	12
Coordination	9
Design	54
Median Crossover	3
Omission	14
Quantities	30
Repair	27
Seeping	4
Shoulders	15
Standard Drawings	1
Striping	11
Thickness	13
Type	15
TOTAL	208

ROW	#
CAP	21
Communication	5
Coordination	15
Easements	13
Fencing	19
Insufficient ROW	6
Omission	5
Private Utilities	3
Quantities	1
TOTAL	88

STRUCTURES	#
Alignment	1
Approaches	8
Beams	3
Bearing Pad	2
CAP	1
Communication	4
Curved Steel Bridge	1
Dimensions	10
Elevation Difference	10
Erosion Control	11
Expansion Joints	6
Fencing	5
Flowable Fill	3
Geotextile Fabric	2
Granular Pile Core	4
Guardrail	12
Handrail	3
High Grade	1
Hold-in-Place Steel	4
Longitudinal Joint	1

STRUCTURES (Cont.)	#
Masonry Coating	7
Omission	41
Painting	3
Patching	3
Phasing	11
Piling/Drilled Shaft	13
Plans	7
Quantities	21
RCBC	9
Rehab	1
Reinforcement Steel	19
Retaining Walls/ MSE	5
Seeping	1
Specifications	5
Standard Drawings	2
Stop Blocks	1
Striping	2
Wing Walls	2
TOTAL	245

TRAFFIC	#
Coordination	2
Lighting	29
Markings	5
Omission	24
Pedestrian Signals	3
Quantities	3
Raised Pavement Markers	5
Safety	6
Signals	25
Signs	4
TOTAL	106

UTILITIES	#
CAP	1
Communication	10
Conflicting Information	7
Delays	14
Existing Utilities	57
Inaccurate Location	22
New Utilities	23
Omission	35
Pipe Sizes	4
Plans	13
Quantities	8
Relocation	45
Stacked Utilities	7
TOTAL	246

PERCENTAGES	
Design	23%
Drainage	11%
MOT	11%
Geotechnical	10%
Utilities	8%
Structures	8%
Construction	7%
Pavement	7%
ECP	5%
Traffic	3%
ROW	3%
Environmental	3%
Materials	1%
TOTAL	3084

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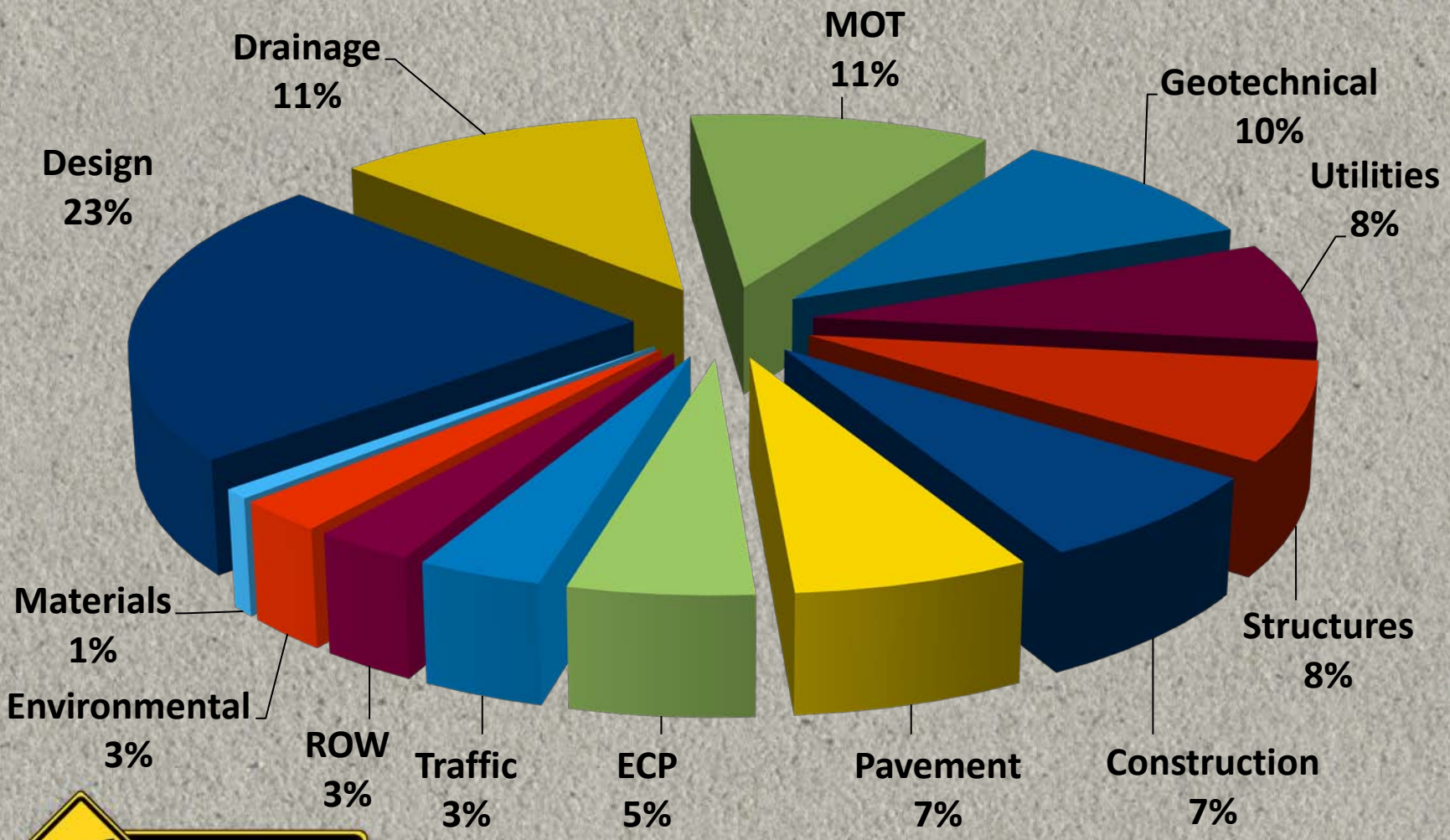
Breakdown of PCR Issues

Statewide PCR Issues (3,098 Total)



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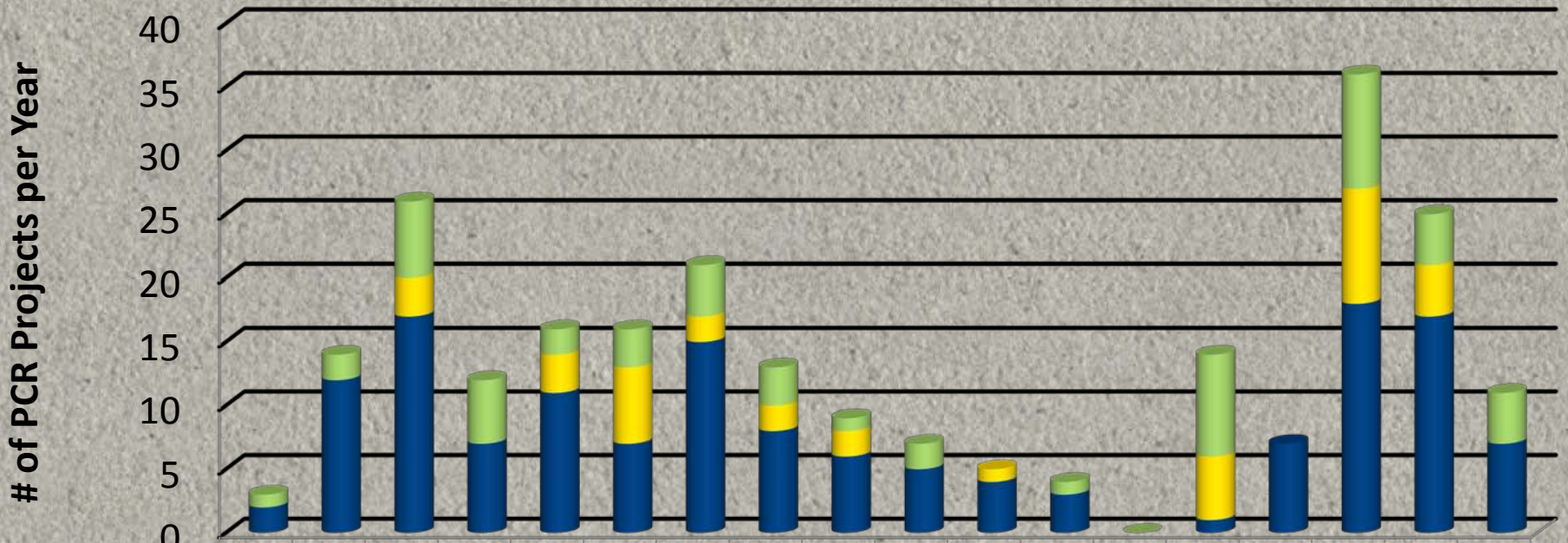
Design Consultant Attendance at Post Construction Reviews



	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12
In-House	1	2	6	5	2	3	4	3	1	2	0	1	0	8	0	9	4	4
Absent	0	0	3	0	3	6	2	2	2	0	1	0	0	5	0	9	4	0
Attended	2	12	17	7	11	7	15	8	6	5	4	3	0	1	7	18	17	7

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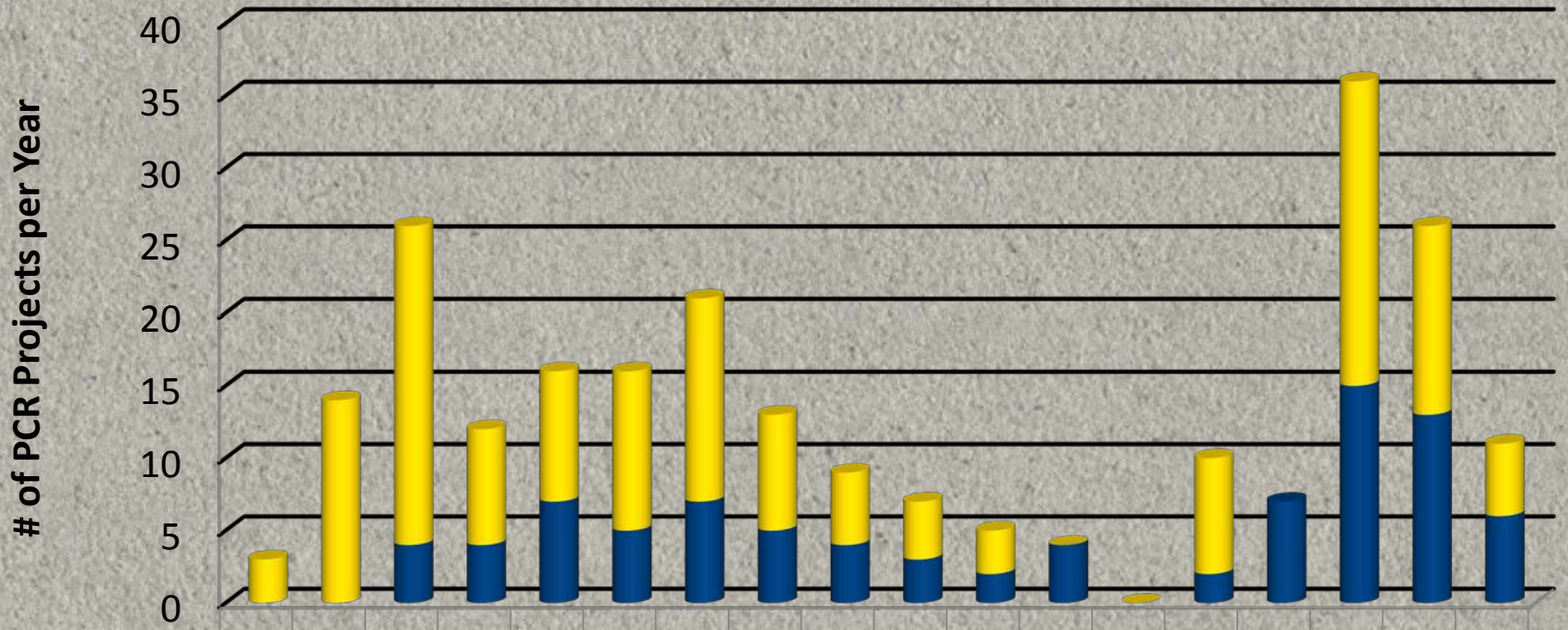
Contractor Attendance at Post Construction Reviews



	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12
Absent	3	14	22	8	9	11	14	8	5	4	3	0	0	8	0	21	13	5
Attended	0	0	4	4	7	5	7	5	4	3	2	4	0	2	7	15	13	6

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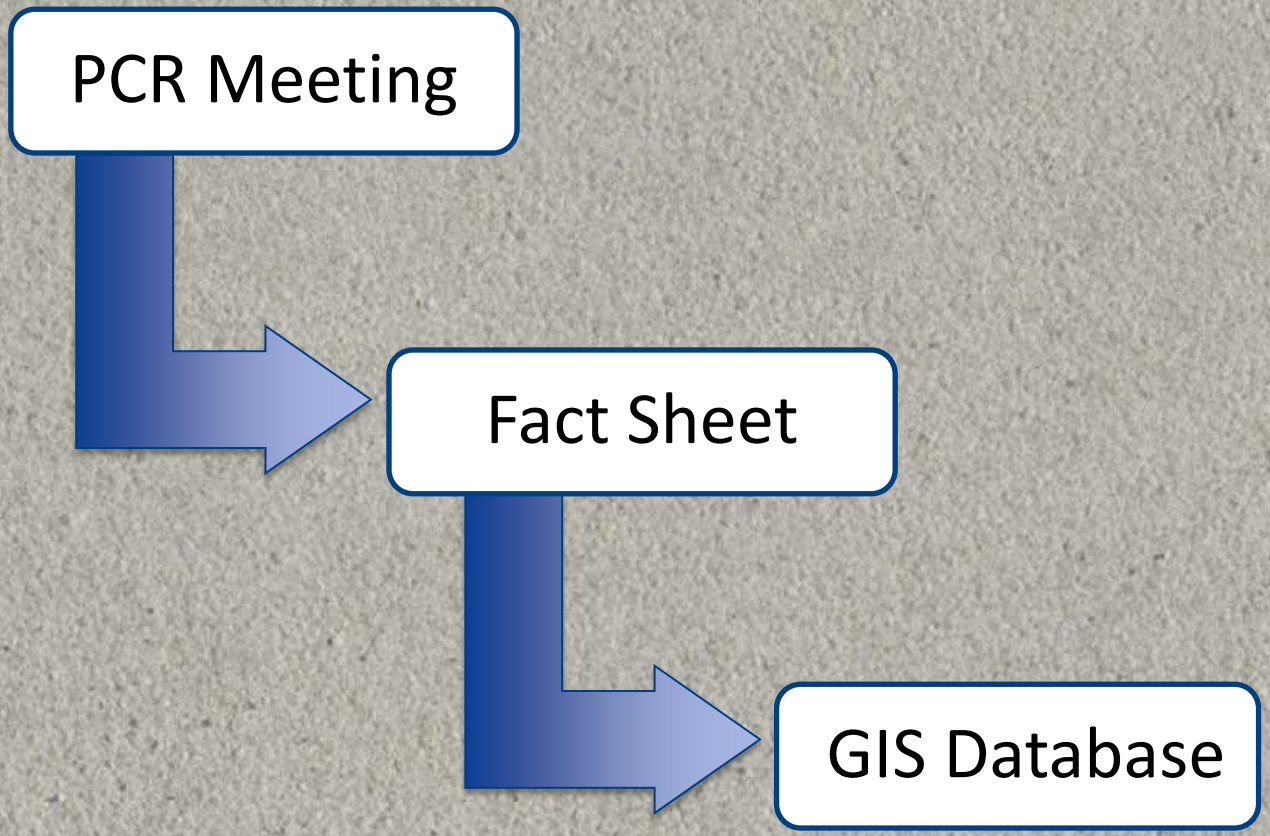
Now that we're collecting this information how do we convey it to others?



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Why should we use GIS to track Quality Assurance?

- Filter data to focus on specific problems
- Emphasize important details
- Track and analyze patterns over time/by location
- Useful for making better decisions and identifying areas of need and improvement

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Analyzing the Data…

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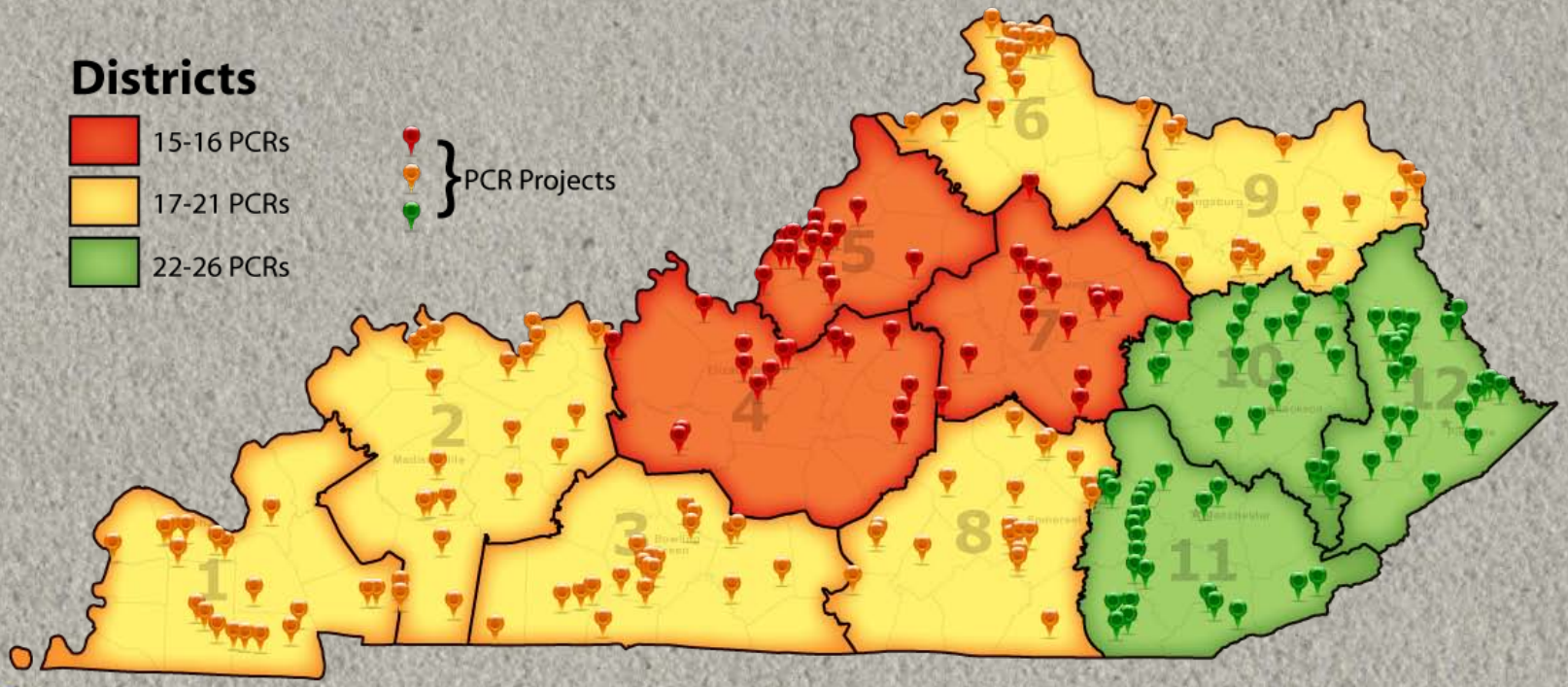
Analyzing the Data…

Which Districts have participated in the most Post Construction Reviews?



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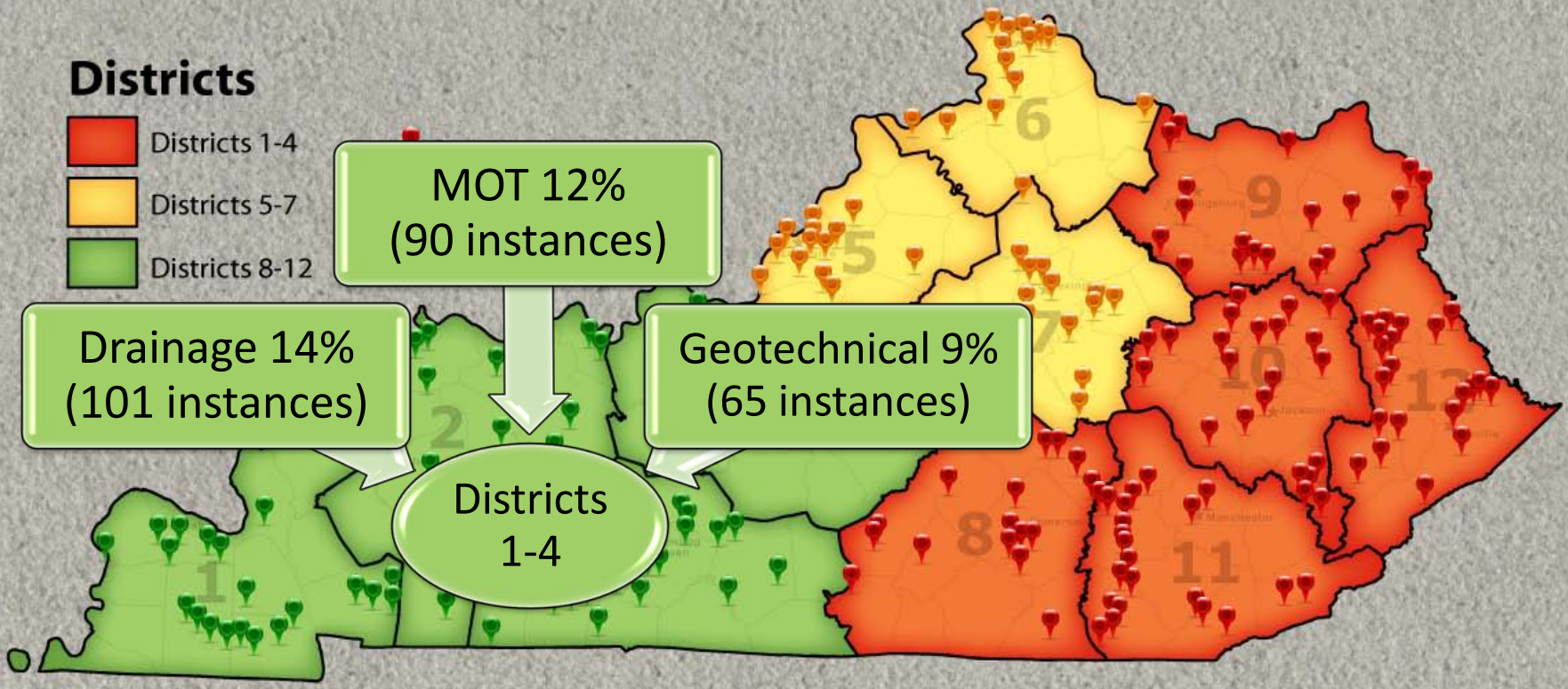
Analyzing the Data…

What are the most common (Non-Design) issues by region?



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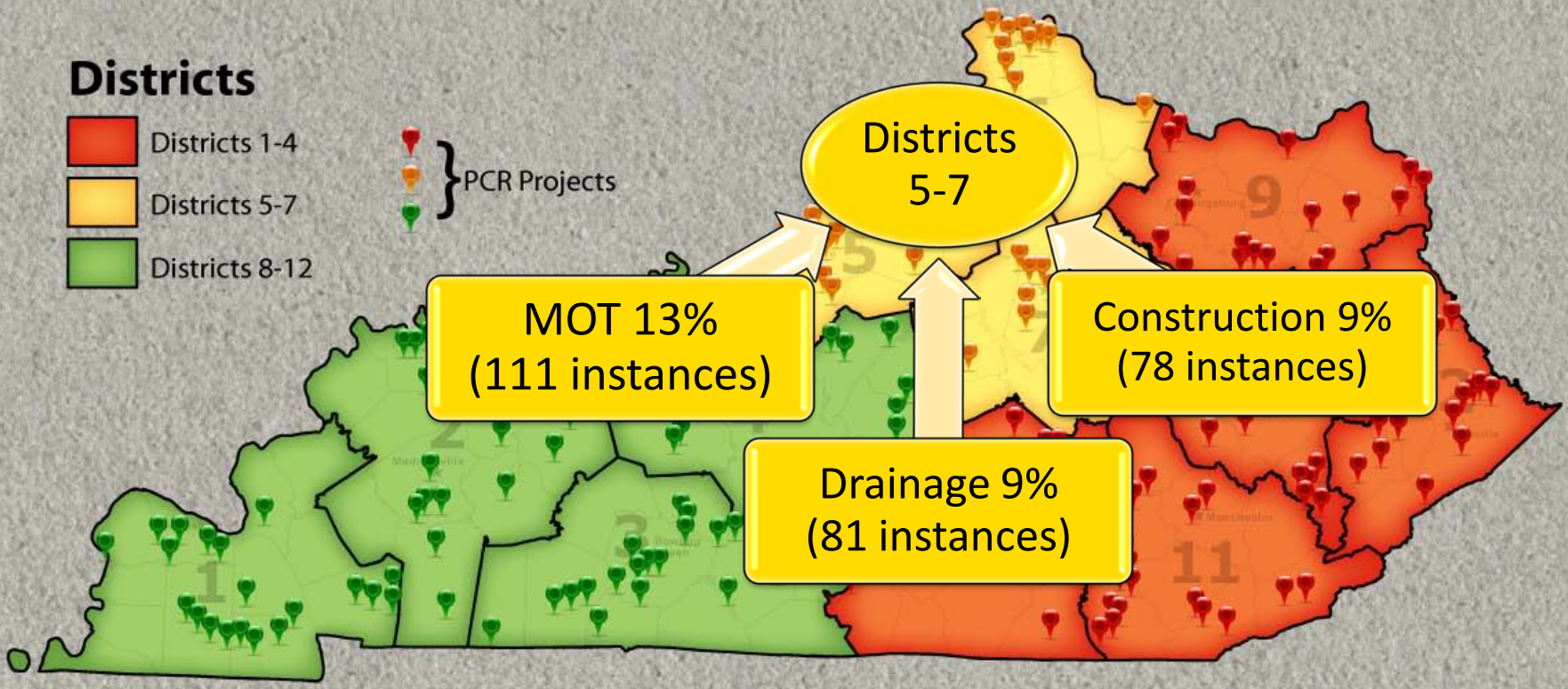

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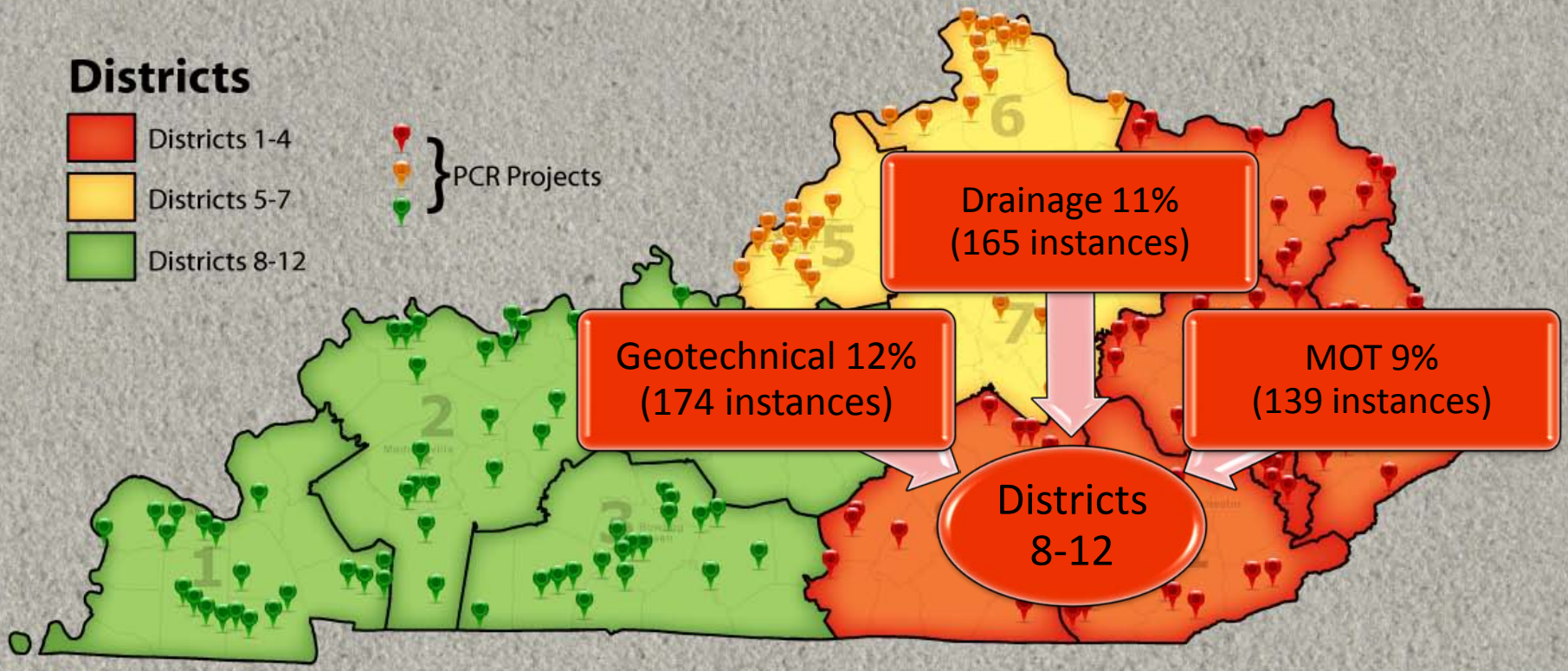

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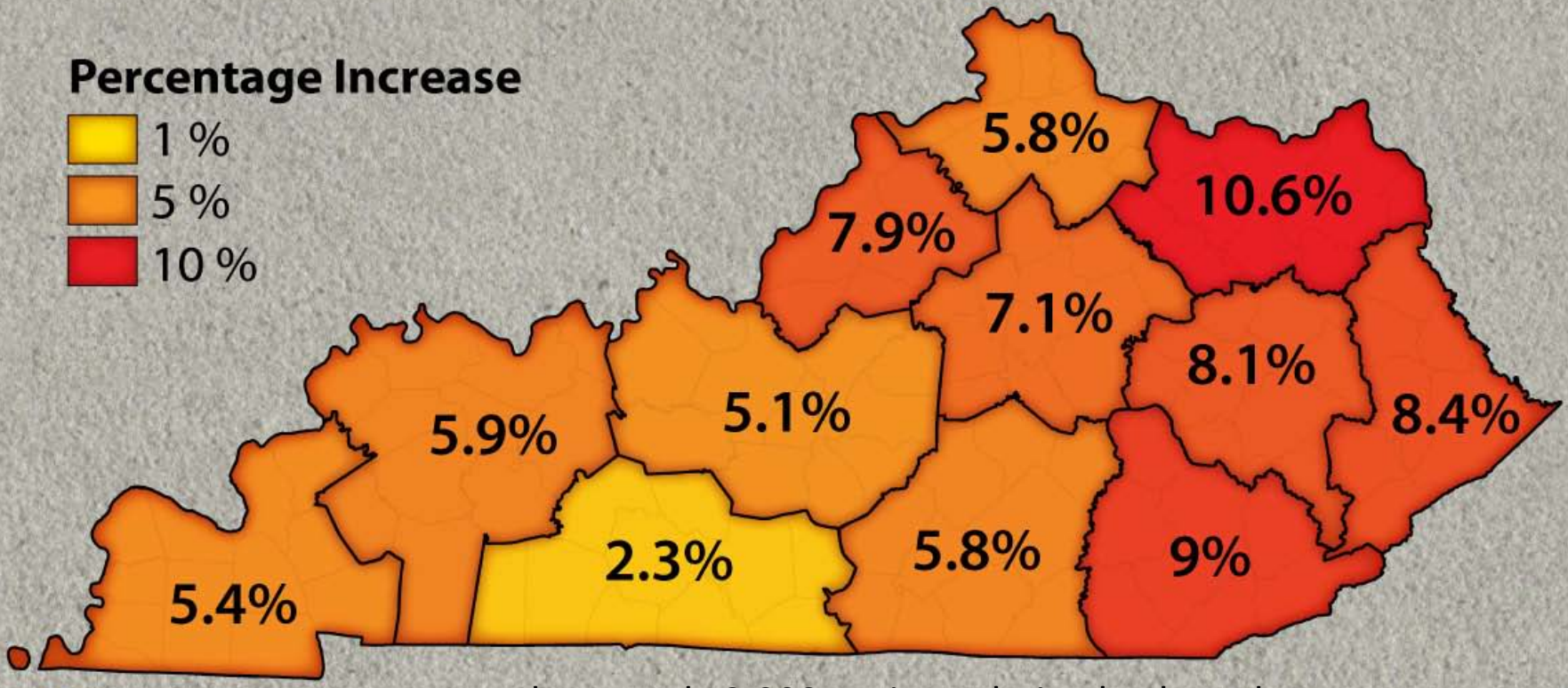
Analyzing the Data…

Where have change orders had the biggest cost impact on projects that have been let since 2000?



Based on nearly 3,000 projects dating back twelve years, the statewide average is 6.02%.

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Analyzing the Data…

How do change order costs compare between projects designed in house (by KYTC) vs. by Consultants?

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KYTC Designs vs. Consultant Designs

- Based on 520 projects from SYP Oracle database w/info about the designer:
  - KYTC Change Order cost increase = 5.7% (164 Projects)
  - Consultant C.O. % cost increase = 5.9% (356 Projects)
  - No Design Data C.O. % increase = 6.3% (2,329 Projects)

Analyzing the Data…

District	C.O. % Increase	Number of Consultant Designed Projects
1	4.9%	17
2	5.2%	17
3	2.0%	23
4	2.8%	31
5	6.4%	34
6	5.1%	63
7	4.6%	27
8	5.1%	30
9	11.8%	22
10	8.5%	26
11	8.4%	23
12	8.6%	43

Analyzing the Data…

What is the recent trend in change order costs over the past few years?

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Analyzing the Data…

Average Change Order Cost Increase Percentage by Year

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In Conclusion

We greatly value your ideas and opinions. We want to hear your recommendations so we can incorporate them into future projects!

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