



Colorado Springs Utilities
It's how we're all connected

Drake Quarterly Update

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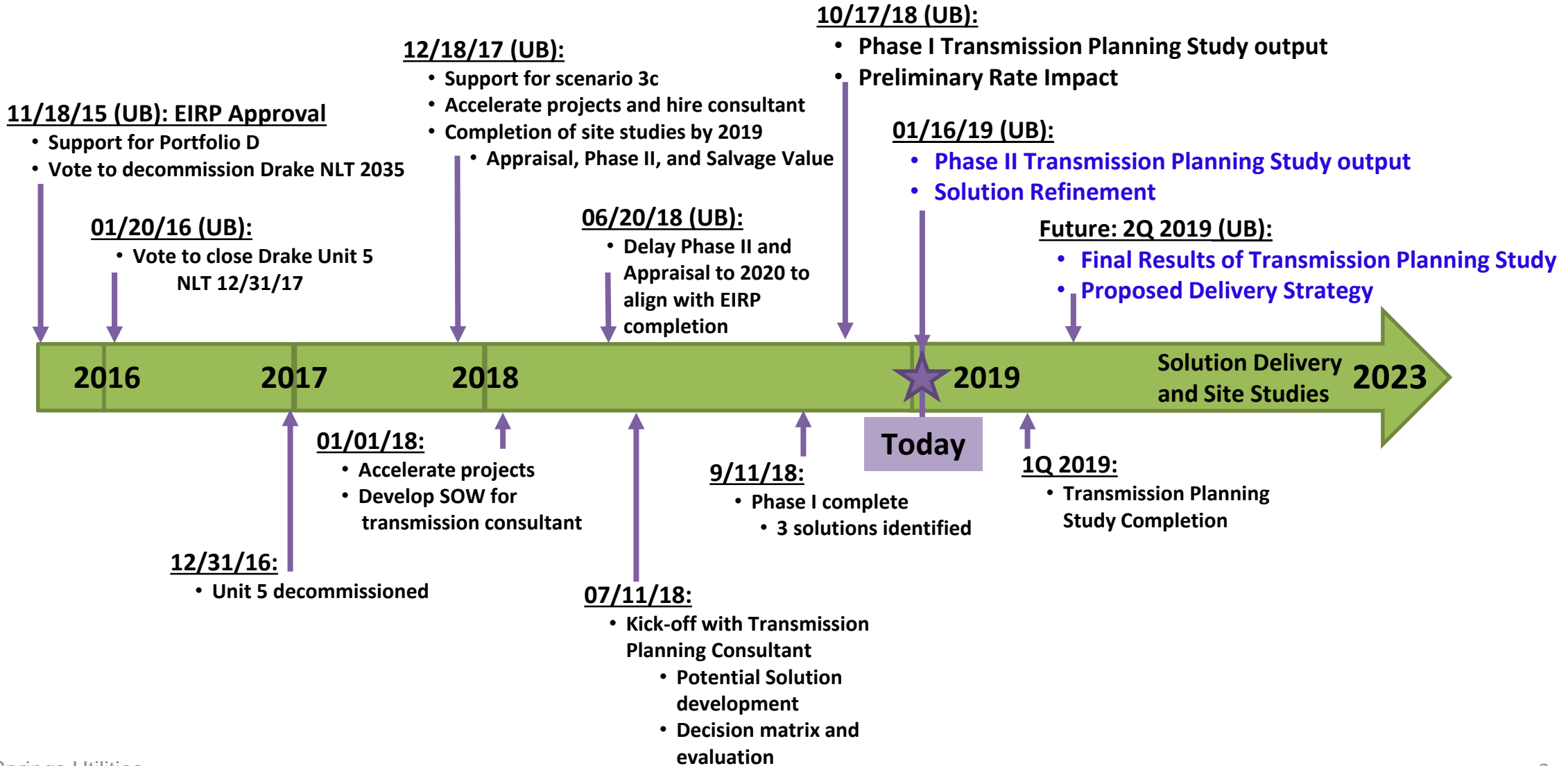
Agenda

- Progress to Date
- Schedule for Major Tasks
- Transmission Planning Study Scope
- Phase I Recap
- Phase II Task Overview
- Phase II Costs and Scoring
- Evaluation of Military Generation Locations
- Next Steps

Progress to Date

Utility Board Direction & Engagement

Project Milestones



Schedule for Major Tasks

BOARD DIRECTION		2018				2019				2020	2021	2022	2023
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Active Transmission System Projects	1. "Accelerate planned projects..."	Kelker Transformer											
		Cottonwood Transformer											
						Nixon-Kelker Upgrade							
										North System Solution			
Pending Transmission Planning Solution	2. "Retain consultant..."	Transmission Planning Study											
						Overhead Transmission Design & Construction							
						Underground Transmission Design & Construction							
						Substation Design & Construction / Upgrades							
Drake Site	3. "Site assessment..."					Salvage Value							
										Phase II			
										Appraisal			
IRP	4. "Complete IRP..."									EIRP			
										GIRP			

Transmission Planning Study Scope

Phase 1: Solution Development and Scoping

- Reviewed 10 / 20 year system models to determine solution development and scoping
- Evaluation by use of matrix and advancement of 3 solutions

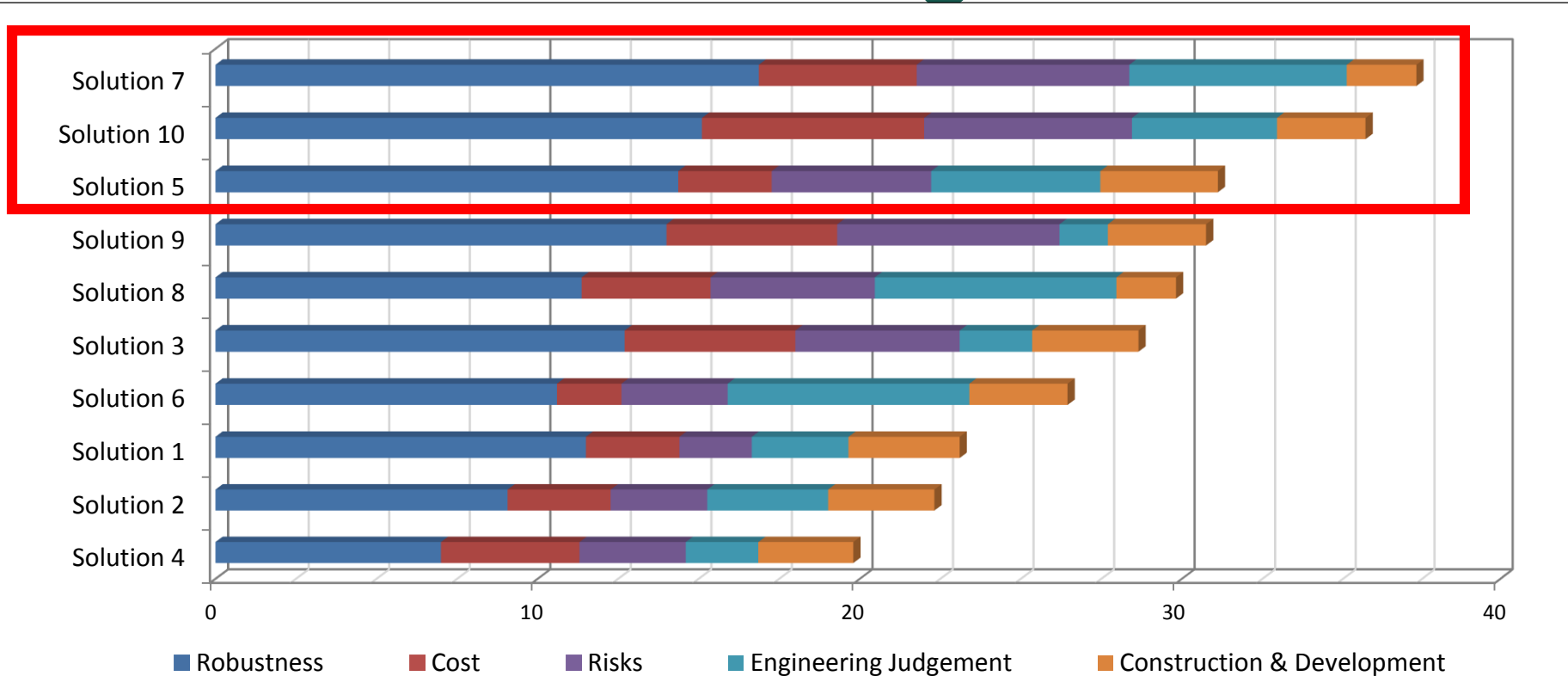
Phase 2: Solution Sensitivity Analysis

- Impact analysis of replacement generation options
- Sensitivity Analysis: spot load and extreme events
- Evaluation by use of matrix and advancement of 2 solutions

Phase 3: Preferred Solution Sensitivity Analysis

- Significant stressing of solution to ensure robustness
- Identification of preferred solution

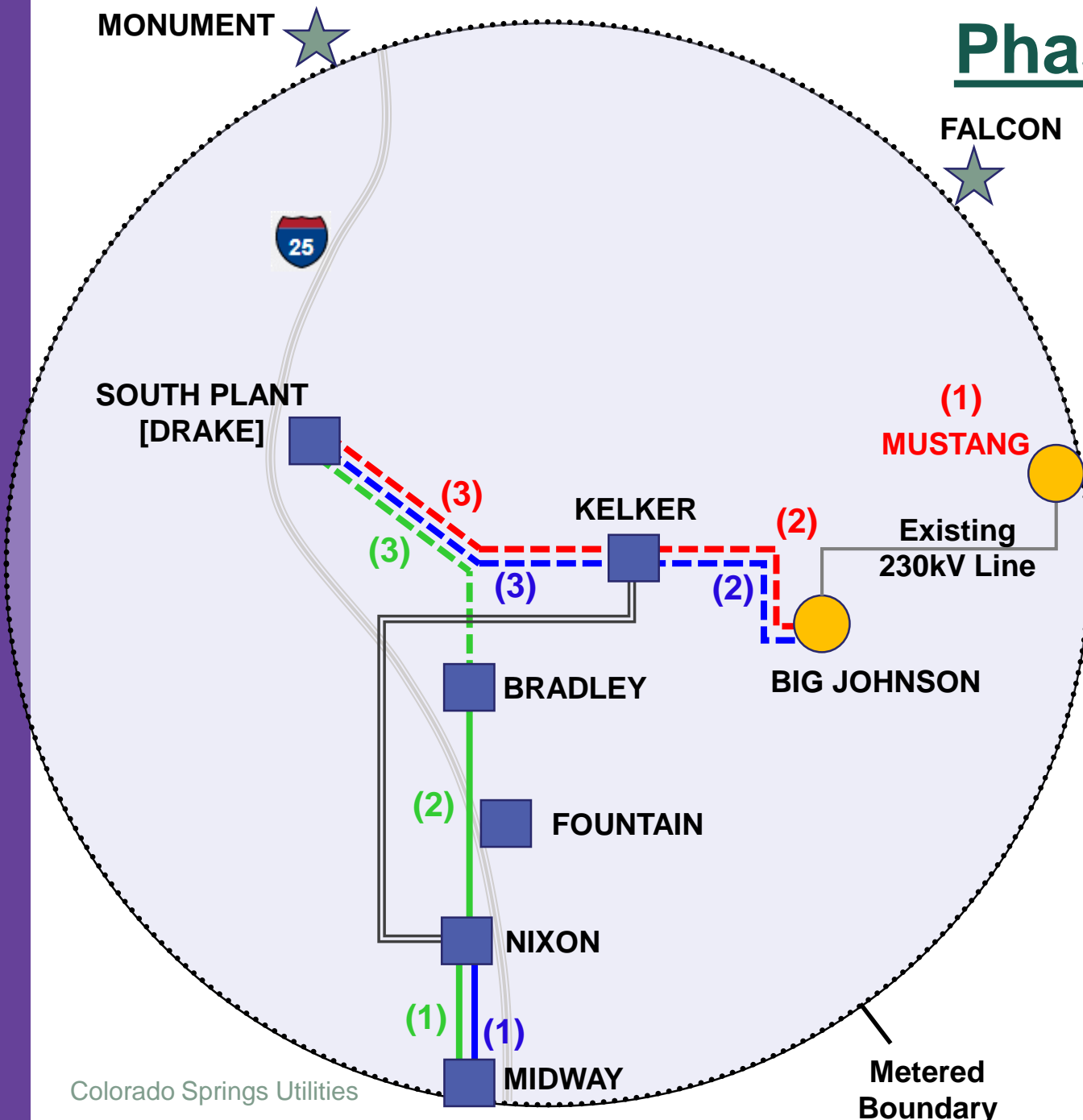
Phase I Solutions Scoring








Major Category	Weight	Solution 4	Solution 2	Solution 1	Solution 6	Solution 3	Solution 8	Solution 9	Solution 5	Solution 10	Solution 7
Robustness	40%	7.00	9.07	11.50	10.60	12.70	11.37	14.00	14.37	15.10	16.9
Cost	20%	4.30	3.20	2.90	2.00	5.30	4.00	5.30	2.90	6.90	4.9
Risks	15%	3.30	3.00	2.25	3.30	5.10	5.10	6.90	4.95	6.45	6.6
Engineering Judgment	15%	2.25	3.75	3.00	7.50	2.25	7.50	1.50	5.25	4.50	6.8
Construction & Development	10%	2.95	3.30	3.45	3.05	3.30	1.85	3.05	3.65	2.75	2.2
Total Composite Score	100%	19.80	22.32	23.10	26.45	28.65	29.82	30.75	31.12	35.70	37.32

Phase 1 Schematic Summary

- Drake and Birdsall removed
- Generation outside metered boundary (“1”)

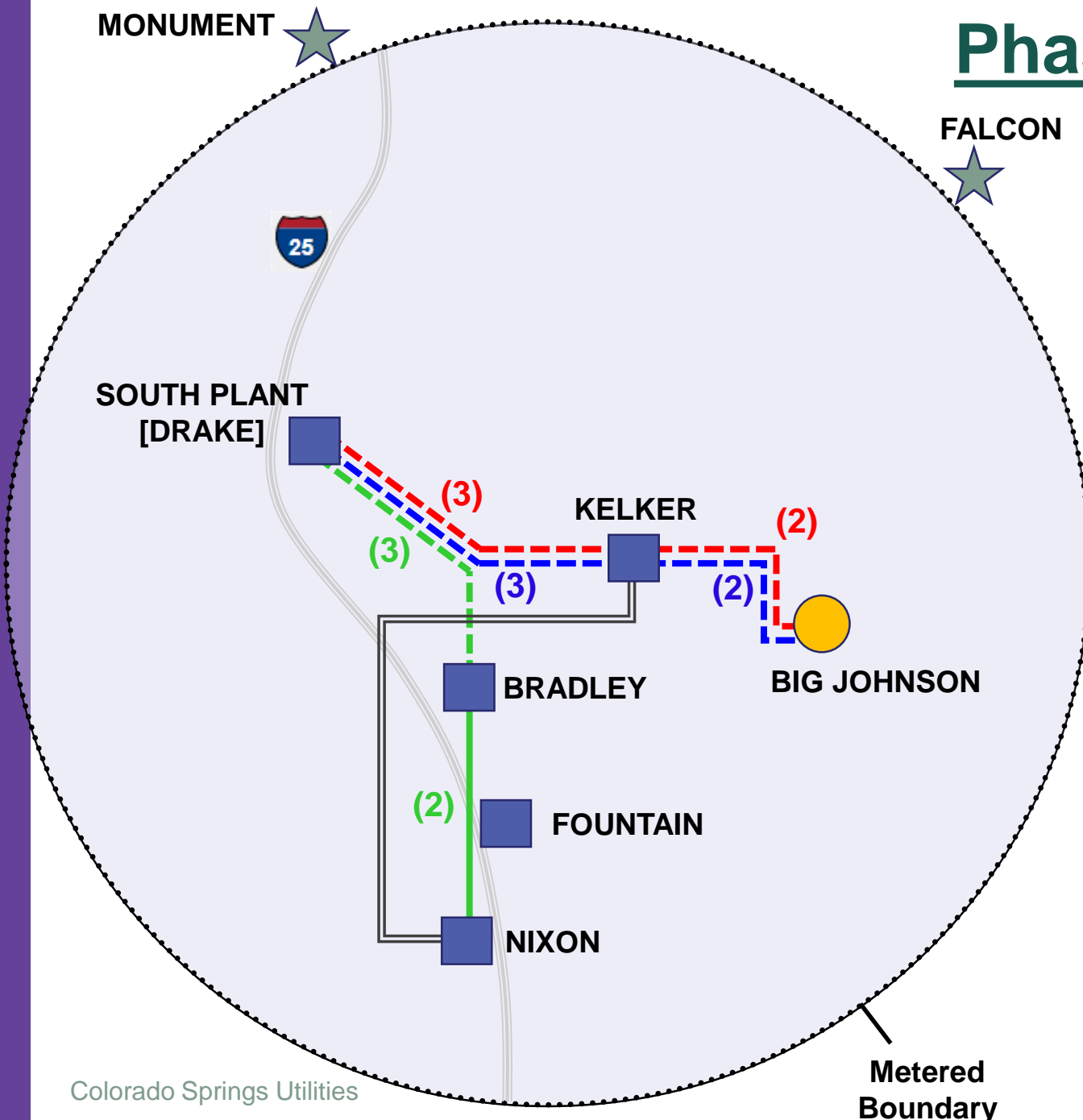


Solution	Projects (New Construction)	
5.1	(1)	Mustang Substation
	(2)	230kV UG Line Big Johnson-Kelker
	(3)	115kV UG Line Kelker-South Plant
7.1	(1)	230kV OH Line Midway-Nixon
	(2)	230kV UG Line Big Johnson-Kelker
	(3)	115kV UG Line Kelker-South Plant
10.1	(1)	230kV OH Line Midway-Nixon
	(2)	230kV OH Line Nixon-Bradley
	(3)	115kV UG Line Bradley-South Plant

	Existing Substation
	New Substation
	New Overhead Transmission Line
	New Underground Transmission Line
	Nixon-Kelker 230kV Line Upgrade (common to all solutions)

Phase 2 Schematic Summary

- Drake and Birdsall removed
- Generation inside metered boundary (“.2”)



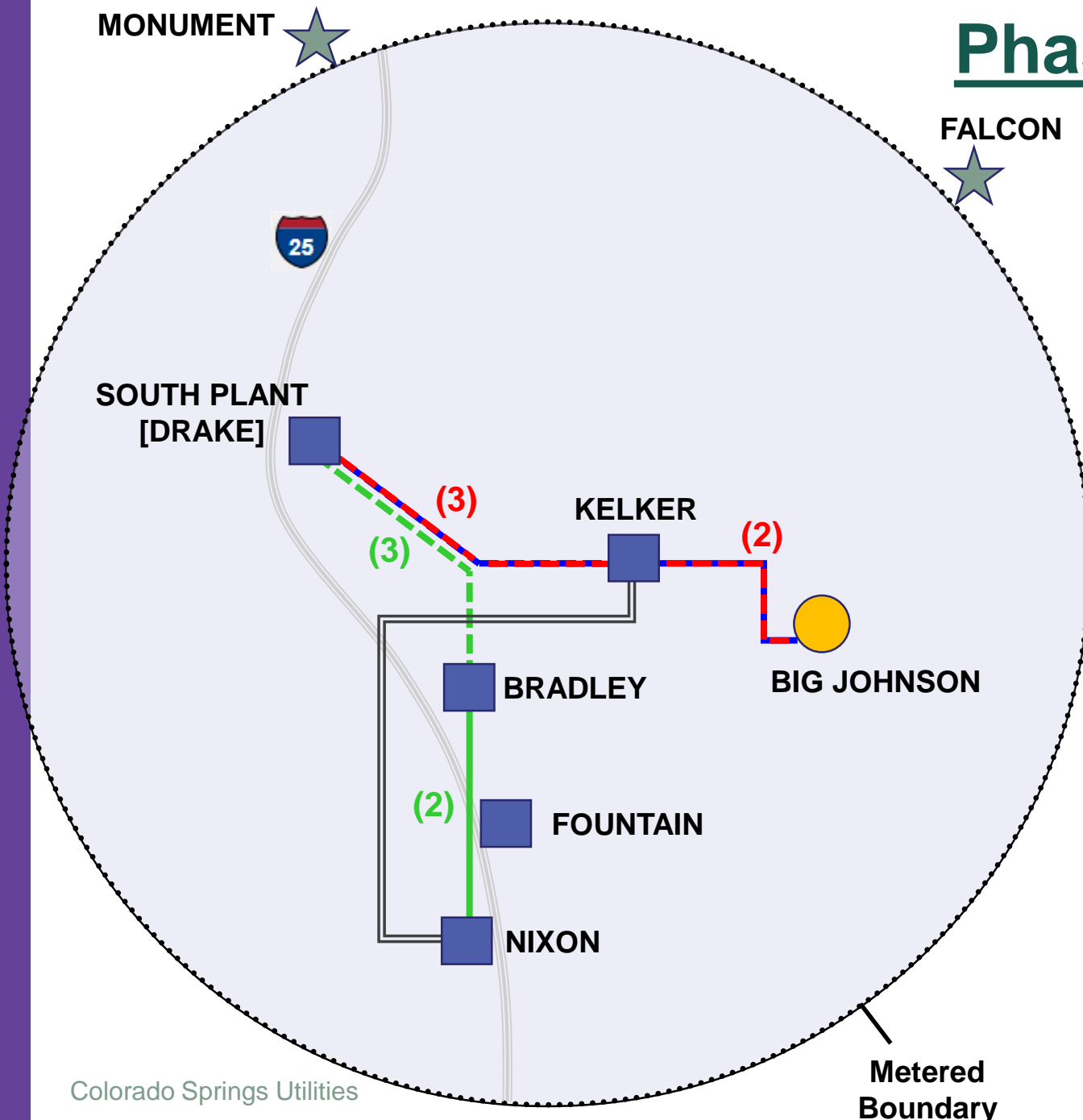
Solution	Projects (New Construction)	
5.2	(2)	230kV UG Line Big Johnson-Kelker
	(3)	115kV UG Line Kelker-South Plant
7.2	(2)	230kV UG Line Big Johnson-Kelker
	(3)	115kV UG Line Kelker-South Plant
10.2	(2)	230kV OH Line Nixon-Bradley
	(3)	115kV UG Line Bradley-South Plant






- Existing Substation
- New Substation
- New Overhead Transmission Line
- New Underground Transmission Line
- Nixon-Kelker 230kV Line Upgrade (common to all solutions)

Phase 2 Schematic Summary

- Drake and Birdsall removed
- Generation inside metered boundary (“.2”)
- 5/7.2 merge to become single solution

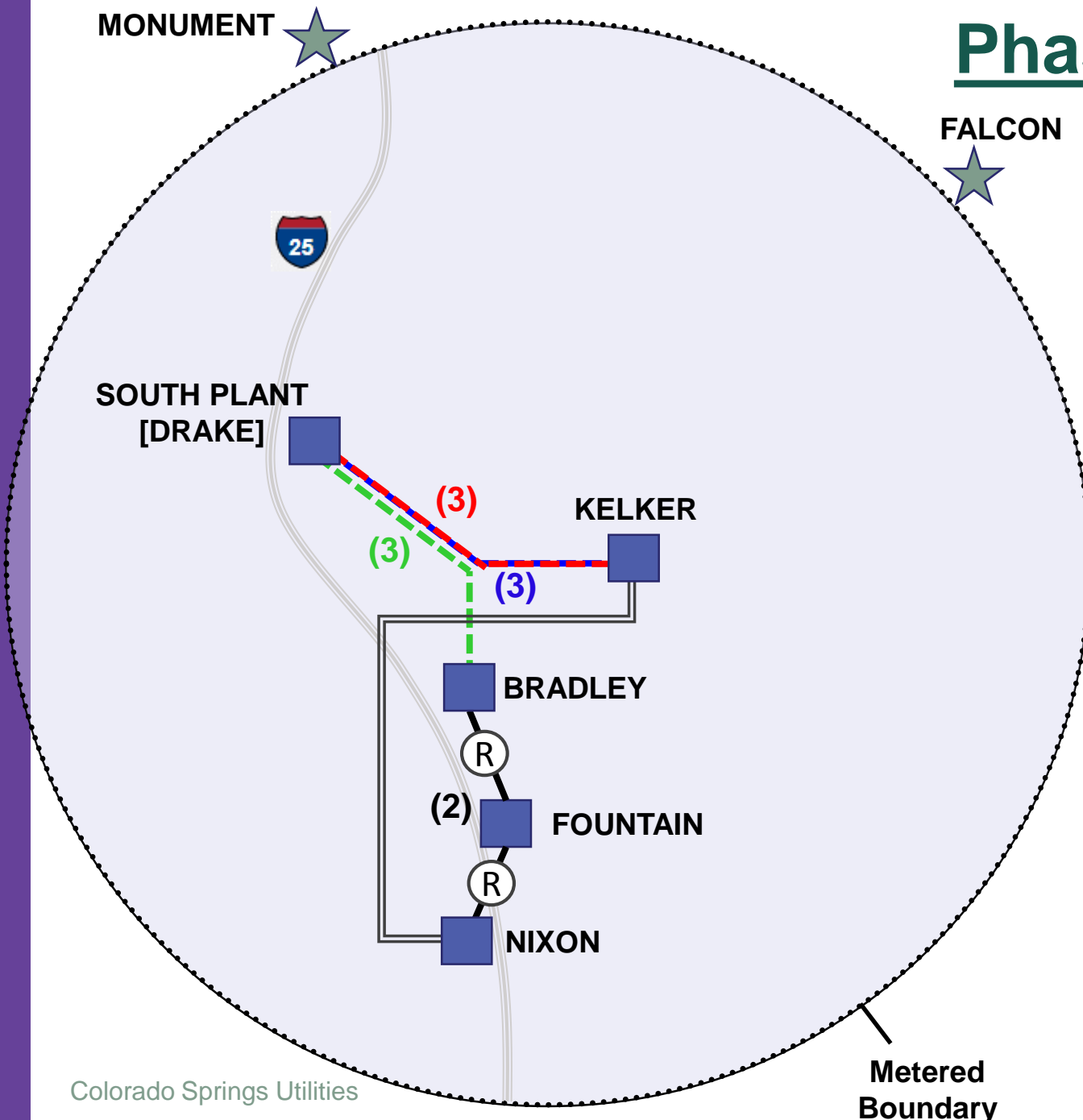
Solution	Projects (New Construction)	
5/7.2	(2)	230kV UG Line Big Johnson-Kelker
	(3)	115kV UG Line Kelker-South Plant
10.2	(2)	230kV UG Line Nixon-Bradley
	(3)	115kV UG Line Bradley-South Plant



	Existing Substation
	New Substation
	New Overhead Transmission Line
	New Underground Transmission Line
	Nixon-Kelker 230kV Line Upgrade (common to all solutions)

Phase 2 Schematic Summary

- Drake and Birdsall removed
- Generation inside metered boundary (“.2”)
- Cost reduction while maintaining reliability

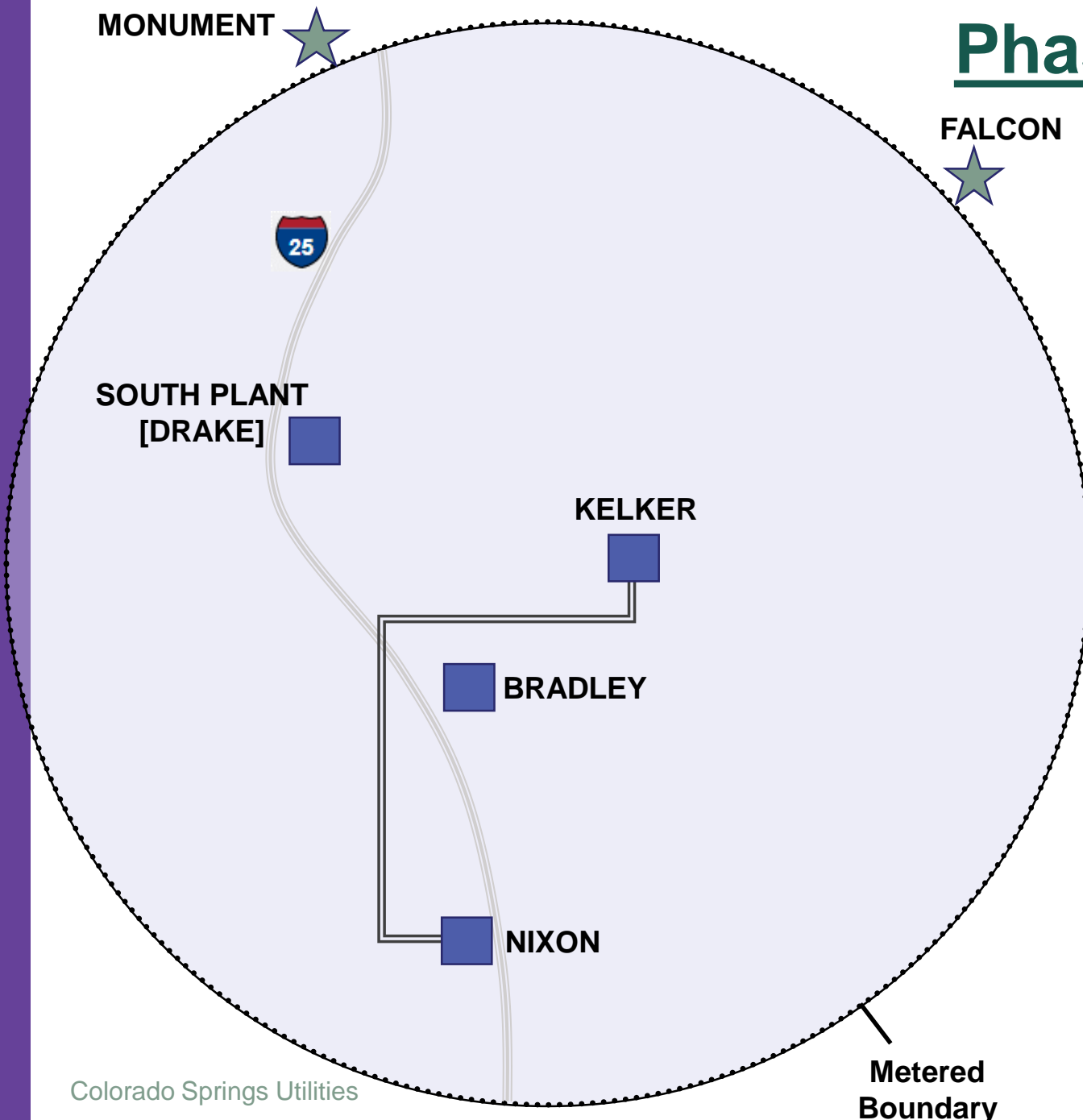


Solution	Projects (New Construction)
5/7.2	230kV UG Line Big Johnson-Kelker
	(2) Reconductor Existing 115kV OH Line Nixon-Fountain-Bradley
	(3) 115kV UG Line Kelker-South Plant
10.2	230kV UG Line Nixon-Bradley
	(2) Reconductor Existing 115kV OH Line Nixon-Fountain-Bradley
	(3) 115kV UG Line Bradley-South Plant

	Existing Substation
	New Substation
	New Overhead Transmission Line
	New Underground Transmission Line
	Nixon-Kelker 230kV Line Upgrade (common to all solutions)

Phase 2 Schematic Summary

- Drake and Birdsall removed
- Replacement Generation at Drake (".3")



Solution	Projects (New Construction)
5.3	NO NEW TRANSMISSION PROJECTS REQUIRED
7.3	
10.3	

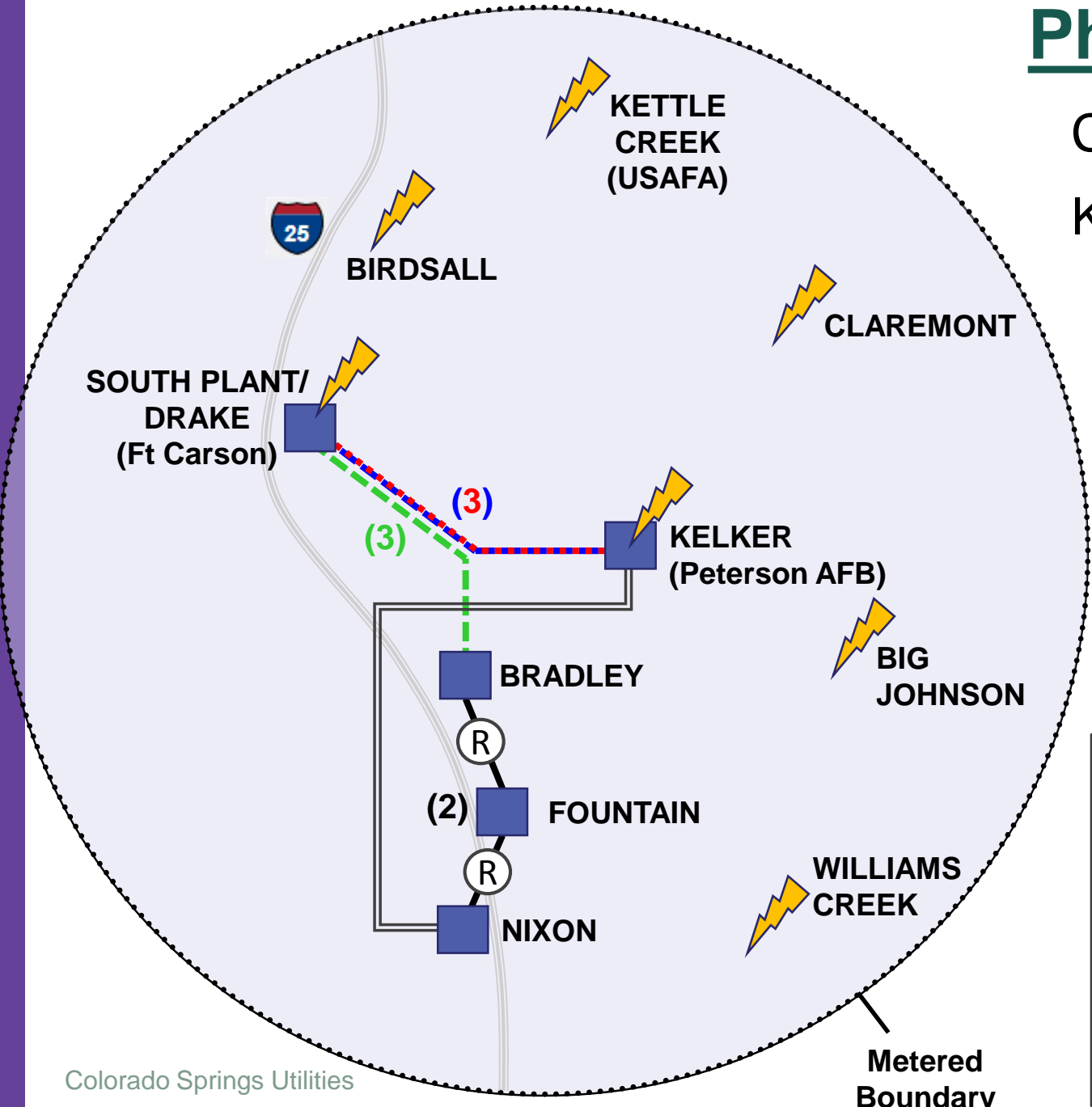
- Existing Substation
- New Substation
- New Overhead Transmission Line
- New Underground Transmission Line
- Nixon-Kelker 230kV Line Upgrade (common to all solutions)






Phase 2 Schematic Summary

Combined Generation and Transmission

Key Findings:

- Replacement generation at South Plant (Drake) is the optimal location to minimize or defer transmission
 - Excess generation at South Plant is needed to completely eliminate transmission projects
- Targeted replacement generation at sites other than South Plant does not defer transmission projects
- The transmission solutions are flexible; allow replacement generation at several locations within the system



	Existing Substation
	Replacement Generation & Modeled Location
	Reconductor Existing Transmission Line
	New Underground Transmission Line
	Nixon-Kelker 230kV Line Upgrade (common to all solutions)

Evaluation of Military Generation Locations

Study Parameters and Key Findings:

- Drake and Birdsall removed from system
- Placed Generation at the Military facilities within Utilities' system
- Generation alone does not defer transmission projects though the generation project(s) may still be beneficial for other reasons

Line Overload
Line within Operational Parameters
Line approaching limits

Replacement Generation at Military Locations without Transmission:

Generation Location	Peterson AFB	USAFA	Ft. Carson
Transmission-Line 1			
T-Line 2			
T-Line 3			
T-Line 4			
T-Line 5			
T-Line 6			
T-Line 7			
T-Line 8			
T-Line 9			

Combined Replacement Generation and Transmission Solutions:

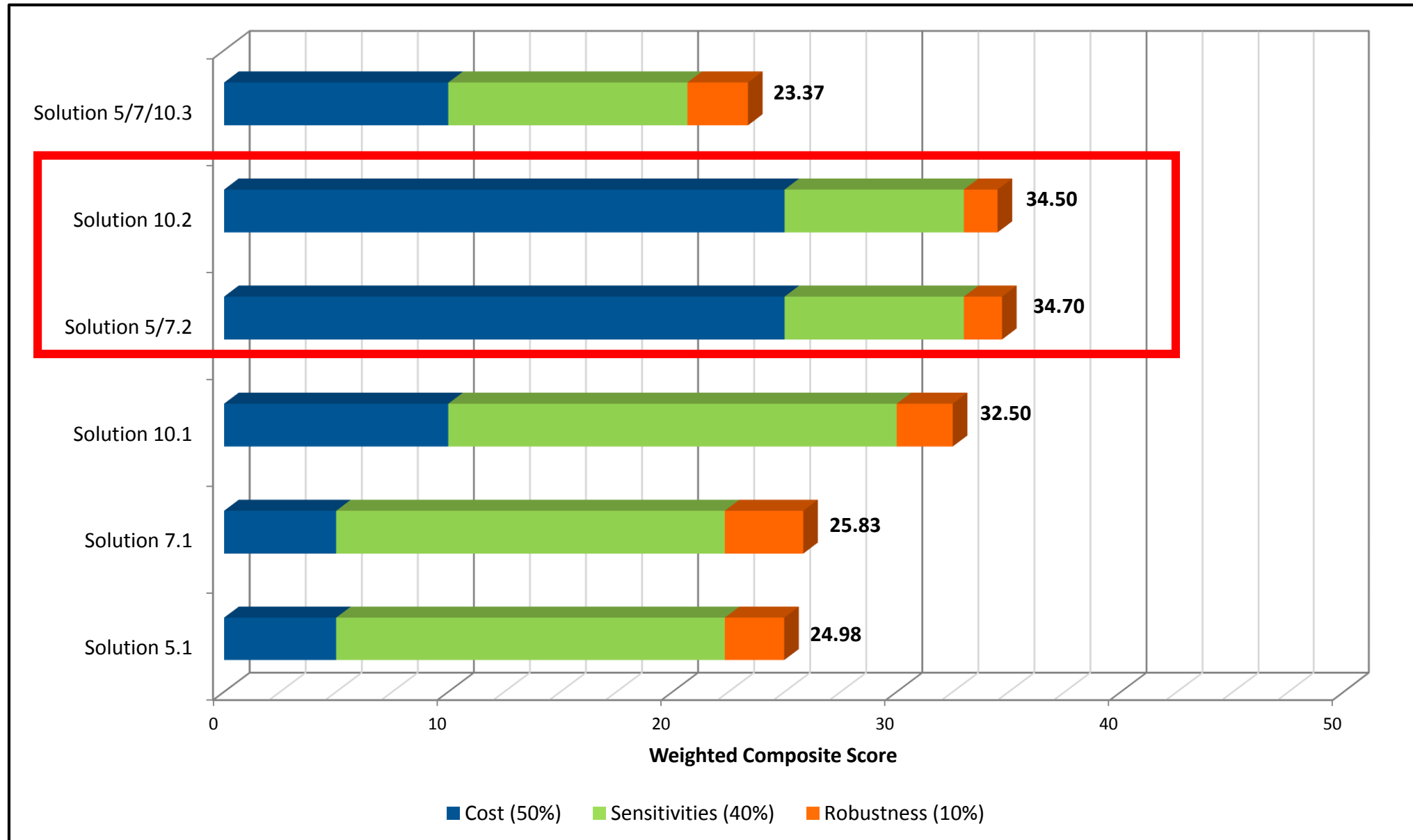
Generation Location	Peterson AFB		USAFA		Ft. Carson	
	5/7.2	10.2	5/7.2	10.2	5/7.2	10.2
Transmission-Line 1						
T-Line 2						
T-Line 3						
T-Line 4						
T-Line 5						
T-Line 6						
T-Line 7						
T-Line 8						
T-Line 9						

Phase 2 Solution Cost Estimating

Generation Scenario:	.1 - OUTSIDE METERED BOUNDARY			.2 - INSIDE AWAY FROM CORE (INCLUDES MILITARY)		.3 - NEAR CORE
	Solution:	5.1	7.1	10.1	5/7.2	10.2
Transmission Projects	\$229 M	\$213 M	\$145 M	\$128 M	\$98 M	--
Generation Projects	\$115 M	\$115 M	\$115 M	\$115 M	\$115 M	\$305 M
Operational Improvement Projects	--	--	\$36 M	--	\$10 M	\$17 M
Grand Total	\$344 M	\$328 M	\$296 M	\$243 M	\$223 M	\$322 M

- All costs shown in the table above are Class 5 cost estimates and reflect capital expenses in 2018 dollars without including internal labor, O&M, or fuel
- Explored adding generation at city's core to further eliminate transmission projects (.3)
 - Matching existing generation at Drake eliminates transmission (Solution 5/7/10.3)
- Generation cost estimates are preliminary and assume economies of scale
 - Any partitioning of generation could result in different costs

Phase II Solution Scoring



Next Steps and Future Utilities Board Updates

- Advancement of solutions 5/7.2 and 10.2 for further evaluation and testing in Phase III
- 2nd Quarter update to Utilities Board
 - Identification of a preferred solution
 - Financial analysis of solutions
 - Proposed delivery strategy



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Drake Update

Questions & Discussion