ASCE | PIPELINES 2014 CONFERENCE

Portland, OR | August 3-6

From Underground to the Forefront of Innovation and Sustainability

ASCE PIPELINES 2014 CONFERENCE SUMMARY

Jimmy Dang / PUG Treasurer / Oro Loma Sanitary Dist.

NORTHERN CALIFORNIA PIPE USERS GROUP

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- Portland, Oregon – August 3 through 6, 2014
- Theme: "From Underground to the Forefront of Innovation and Sustainability"
- Over 80 exhibits from industry leaders
- Over 200 presentations in 8 program tracks:
  - Planning to Design
  - Design I
  - Design II
  - Construction
  - Condition Assessment
  - O&M I
  - O&M II
  - Sustainability Design

NORTHERN CALIFORNIA PIPE USERS GROUP

Developing a Workable Condition Assessment Program When YourBudget is Extremely Limited!!!

- Tim F. Taylor, PE, and Paul Sciuto, PE.
- South Tahoe Public Utility District (STPUD)
- 2 large effluent pump stations
- Over 132,000 linear feet of pipeline
- Study: 56,400 linear feet of welded steel pipe with CML and coal tar epoxy coating, 18 to 21" in diameter, and 2,100 vertical feet of drop
- 45 year old line
- Identified critical sections of pipe for assessment

- Created ports for to insert CCTV inspection equipment (welded saddles)

- CUES Robotic Inspection Equipment
- Results: Collapsed Pipe (Boulder during backfill)

What in-line technologies work best for condition assessment of pipelines, and why?

- Dave Russell of PICA, Pipelines Assessment and Condition Analysis Corp.
- Best tool for a given type of pipeline
  - Remote Field Technology,
  - Ultrasonic
  - Electro-Magnetic Acoustic Technology
  - Magnetic Flux Leakage

- Galvanic Corrosion cells in ductile and cast iron pipe

- Corrosion failure under improperly applied shrink sleeve on steel pipeline

Technique/Characteristic	MFL	RFT	U.T.	EMAT
Requires close contact with the material under test	Y	N	N	Y
Measures relative permeability and local stress	N	Y	N	N
Measures wall thickness of steel directly	N	Y	Y	Y
Measures Absolute and differential values	Y	Y	Abs	Abs
Relative speed	2m/sec	5m/min	0.1m/sec	0.1m/sec

Technique/Characteristic	MFL	RFT	U.T.	EMAT
Applicable for detecting pitting on outside of pipe	Y	Y	Y	Y
Equal sensitivity to O.D. and I.D. wall loss	N	Y	Y	Y
Requires clean, bubble-free liquid couplant	N	N	Y	N
Requires magnetic saturation of pipe	Y	N	N	N
Minimum flaw diameter detectable	0.25”	0.5”	0.2”	0.25”
Minimum depth flaw detectable	10%	20%	2%	5%
Accuracy (within plus minus)*	10%	15%	2%	5%
Requires pipeline change to add launcher	Y	Y	Y	Y
Experienced, verified technique	Y	Y	Y	Y
Can assess joint condition	N	N	N	N
Can detect leakage as well as wall loss	N	N	N	N

- RFT is the most versatile, especially for pipelines that contain internal scale, liners, or tubercles.
- MFL for bare steel pipelines that are clean and have thin liners.
- EMAT for high resolution and sensitivity to small flaws.

Comparing Different Embedment Options for an Open-cut Pipeline Project

- Babak H. Mamaqani, David Marshall, Mohammad Najafi, and Ali Behseresht
- Two types of pipe
  - Steel pipe
  - Prestressed Concrete Cylinder Pipe
- Embedment Options
  - Direct reuse
  - Chemical stablization
  - CLSM using native soils
  - Import granular material
  - Indirect reuse

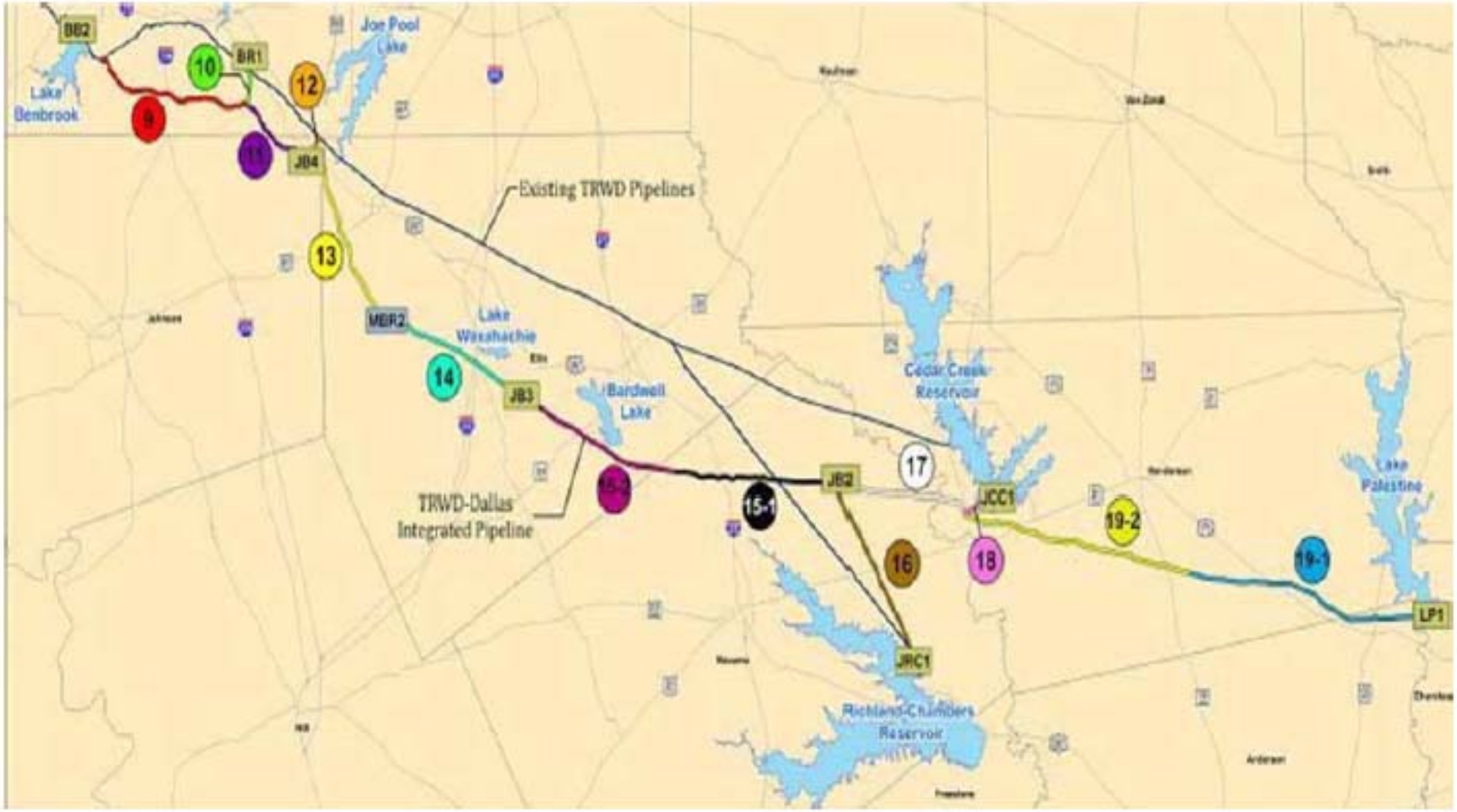
BB2
BR1
10
12
Joe Pool Lake
Lake Benbrook
9
11
JB4
Existing TRWD Pipelines
13
MBR2
Lake Waxahachie
14
JB3
Bardwell Lake
TRWD-Dallas Integrated Pipeline
15-1
JB2
17
Cedar Creek Reservoir
JCC1
19-2
Lake Palestine
16
18
19-1
LP1
JRC1
Richland-Chambers Reservoir

Table 1. Pipe Segment Lengths and Diameters (FUGRO, 2010)

Segment	Length (ft)	Pipe Diameter (in.)
9	77,220	84
10	14,770	84
11	39,190	84
12	7,120	108
13	65,190	108
14	72,350	108
15-2	77,630	108
15-1	79,140	108
16	69,830	96
17	60,390	108
18	8,520	102
19-2	109,050	84
19-1	109,940	84

Table 3. Applicable Options for Each Segment

Segment	Direct Reuse	Stabilization	CLSM	Imported Material	Indirect Reuse
9	No	Yes	Yes	Yes	No
10	No	Yes	Yes	Yes	No
11	No	Yes	Yes	Yes	No
12	No	Yes	Yes	Yes	No
13	No	No	Yes	Yes	Yes
14	No	Yes	Yes	No	No
15-2	No	No	Yes	No	Yes
15-1	No	Yes	Yes	Yes	No
16	No	Yes	Yes	Yes	No
17	No	Yes	Yes	Yes	No
18	No	Yes	Yes	Yes	No
19-2	Yes	Yes	Yes	Yes	No
19-1	Yes	Yes	Yes	Yes	No

Table 4. Unit Cost ($/ft) for Different Segments and Embedment Options for Steel Pipes (R=0.7D) (2014 dollars)

Segment	Direct Reuse	Stabilization	CLSM	Hauling form Borrow Pits/Suppliers	Indirect Reuse	
					CLSM	Stab.
9	N/A	31	17	36	N/A	N/A
10	N/A	31	17	55	N/A	N/A
11	N/A	32	17	56	N/A	N/A
12	N/A	40	22	80	N/A	N/A
13	N/A	N/A	N/A	92	38	70
14	N/A	40	22	N/A	N/A	N/A
15-2	N/A	N/A	N/A	N/A	38	70
15-1	N/A	40	22	77	N/A	N/A
16	N/A	36	20	67	N/A	N/A
17	N/A	50	19	82	N/A	N/A
18	N/A	39	21	85	N/A	N/A
19-2~1	N/A	31	17	59	N/A	N/A
19-2~2	16	N/A	N/A	N/A	N/A	N/A
19-1	16	N/A	N/A	N/A	N/A	N/A
Average	16	37	19	69	38	70

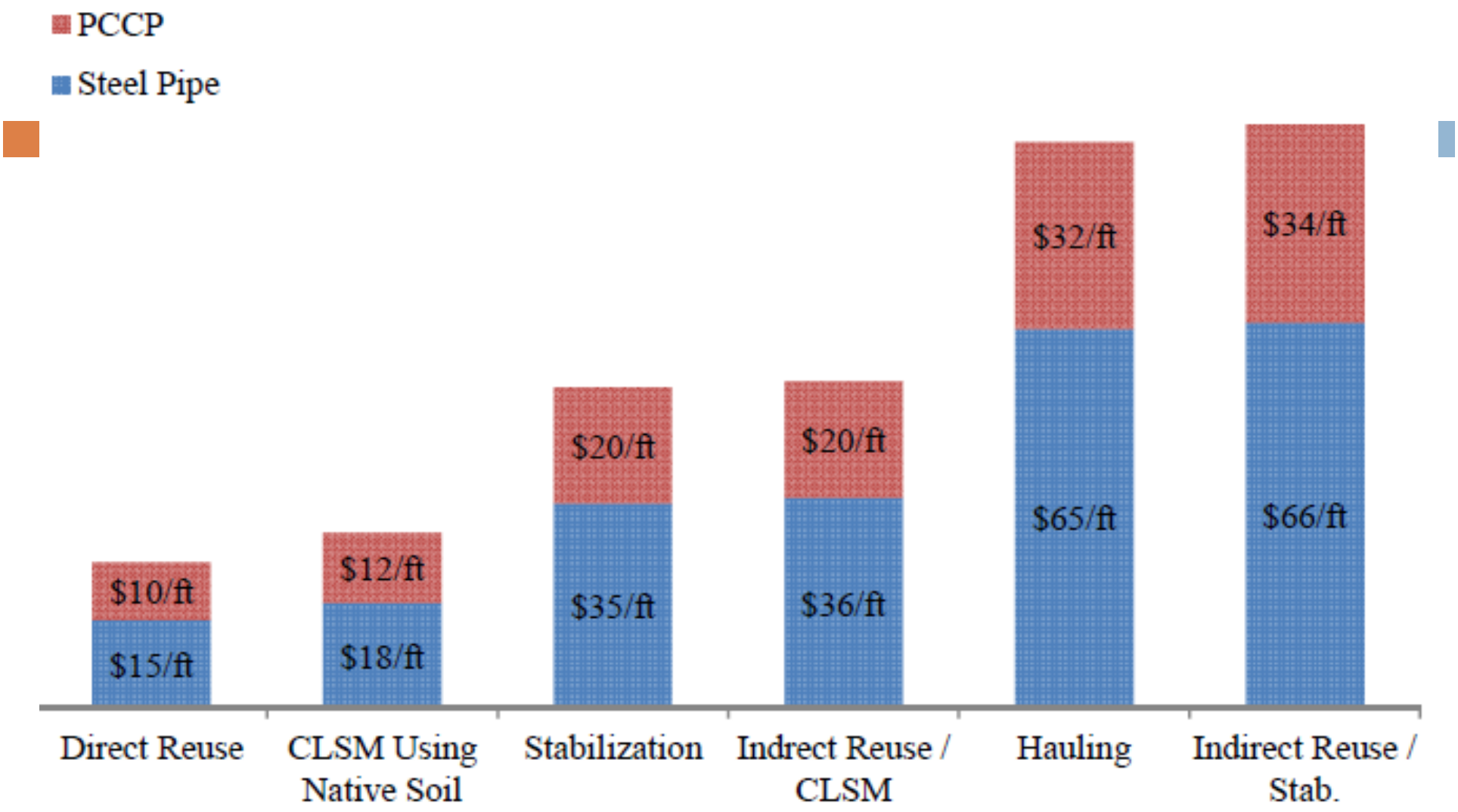

Figure 7. Average Unit Cost ($/ft) for Steel Pipe and PCCP (2014 dollars)

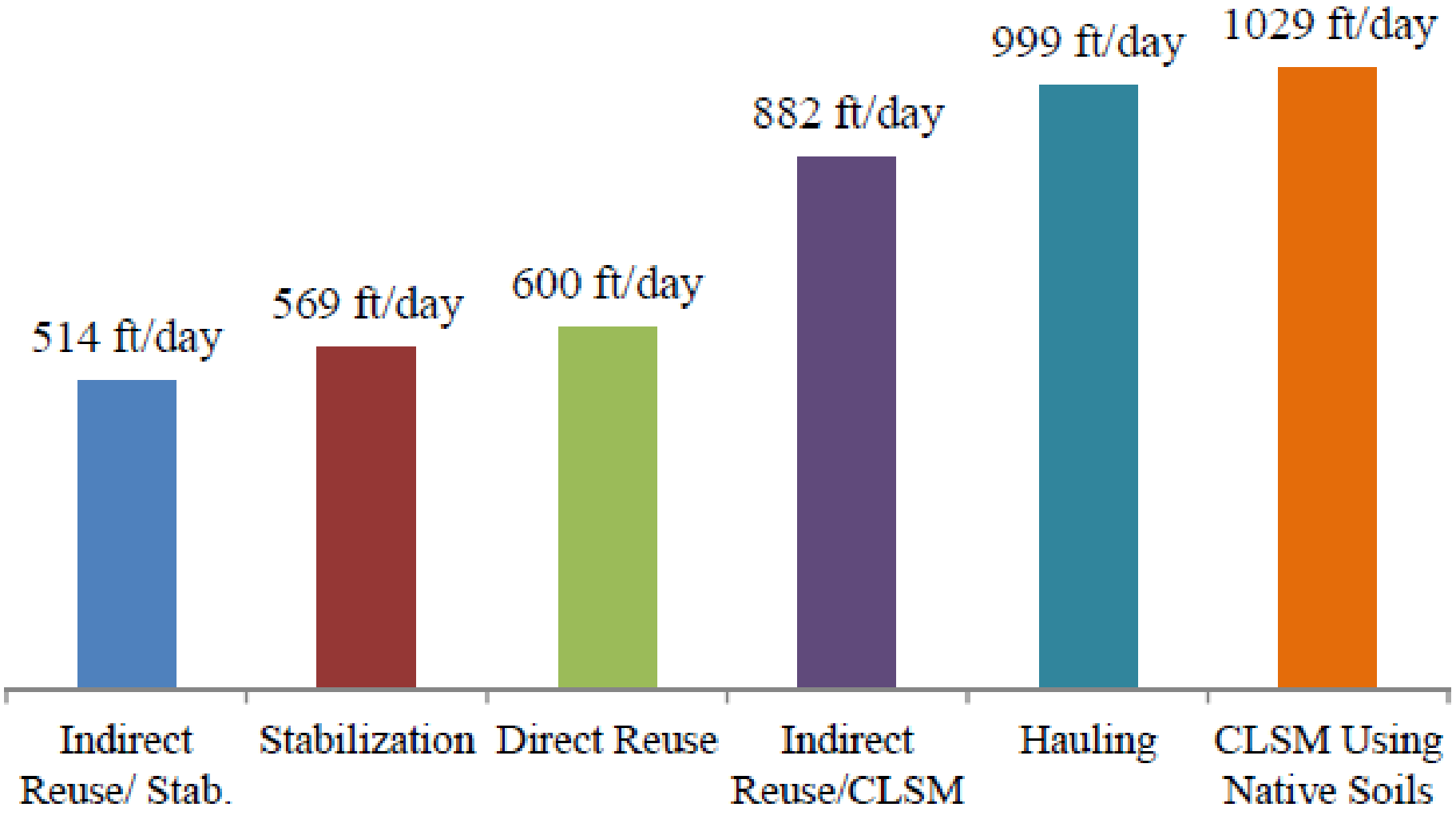

Figure 8. Production Rate (ft/day) of Different Options for PCCP

Considering assumptions made, it was concluded that the CLSM option using native soils for both steel and PCCP pipes was the most productive and cost effective method in all segments except for those segments where the excavated soil had high reusability potential. Results showed that hauling material from borrow pits had higher unit cost than the stabilization, but it was more productive than stabilization which reduces the embedment duration. The final decision of which option is appropriate for each segment to provide embedment material should be made based on unit cost and production rate of applicable options in each segment.

Questions and Comments?