



**37TH INTERNATIONAL
NO - DIG
FLORENCE 2019**

Fortezza da Basso • FLORENCE (Italy)

30th September • 2nd October 2019

MECHANIZED PIPE REHABILITATION DESIGN AND CASE STUDY

Ladan Sahafi – Technical Representative
Americore International (Los Angeles, California)
October 1, 2019

Agenda (Ordine del Giorno)

- Introduction
- Problem at Hand
- Various **Trenchless** Solutions
- Final Design
- Construction Details
- Q&A



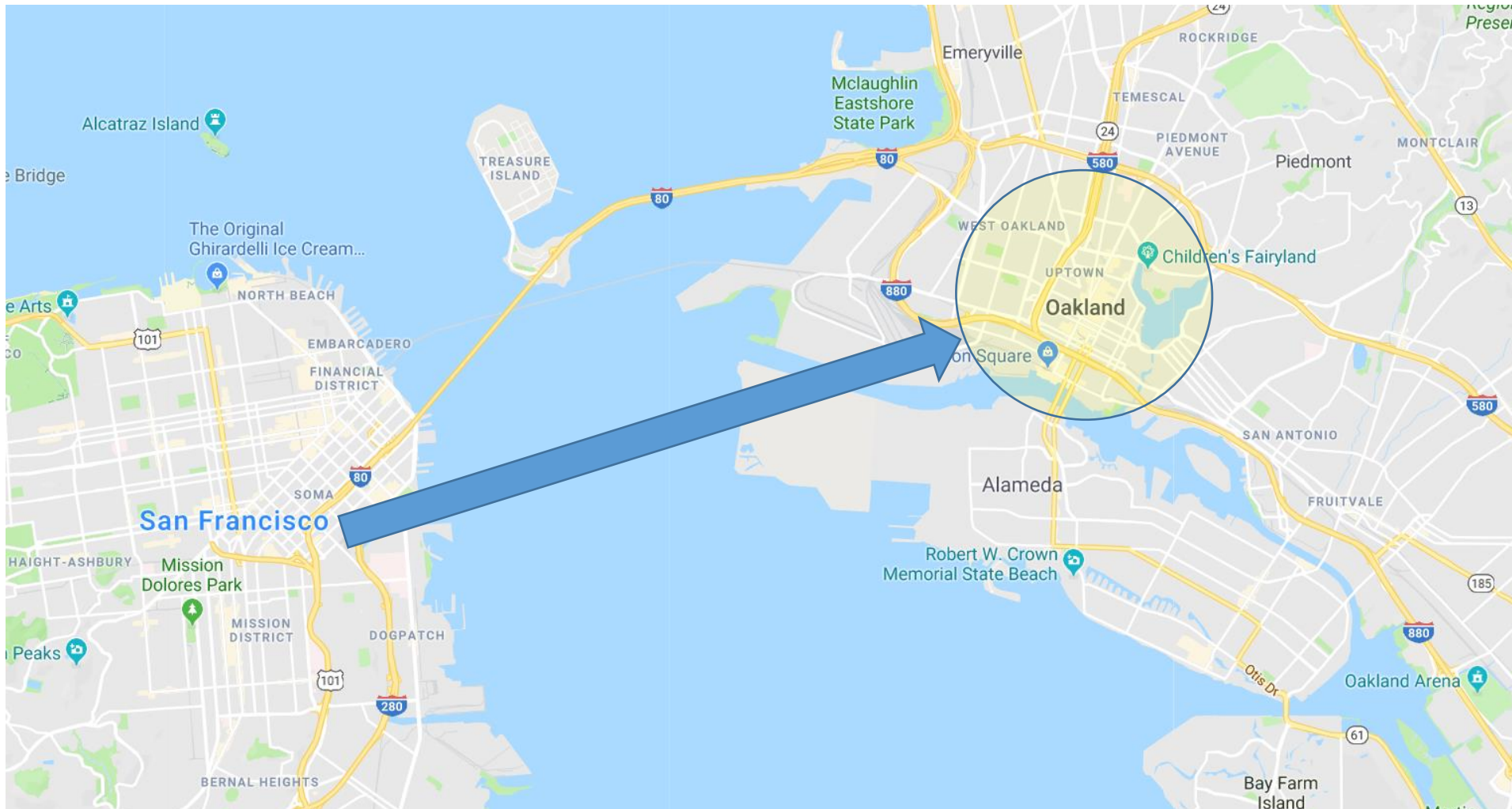
Introduction

- Americore International
- Tustin, California (Near Disneyland!!!)
- Since 2008
 - Akkerman® Sliplining Systems
 - Channeline® Non-Circular GRP
 - LFM® GRP Manholes
 - Closure Couplings
 - Modular Process Units



South Interceptor Sewer Rehab 3rd Street Phase 2 Oakland, California

Problem at Hand (Location)



Problem at Hand (Location)

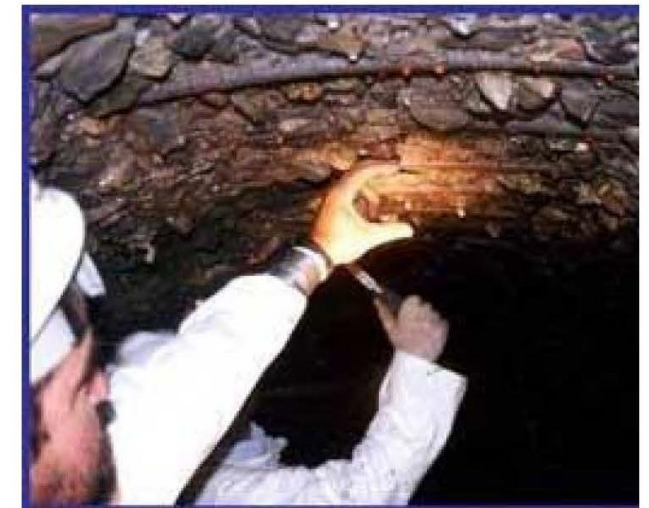


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Problem at Hand (Condition Assessment)

- Owner Agency
 - East Bay Municipal Utilities District
 - Largest Sewer System after SF in the area
- Constructed in 1952-1965
- 16 km (10 miles) overall length
- Sizes from 750 mm (30”) to 2600 mm (105”)
- Carries 60% of “ALL” flows to WWTP in the region
- 1997 assessment confirmed need for rehab
- Rebars are exposed or gone



Problem at Hand (Condition/Curves)



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Code:	LR
Description:	Alignment Right
Distance (ft):	6.8
Structural Grade:	0
O&M Grade:	2
Clock Start/From:	
Clock To:	
1st Value:	
2nd Value:	
Value Percent:	45
Continuous Index:	
Within 8" of Joint:	NO
Remarks:	



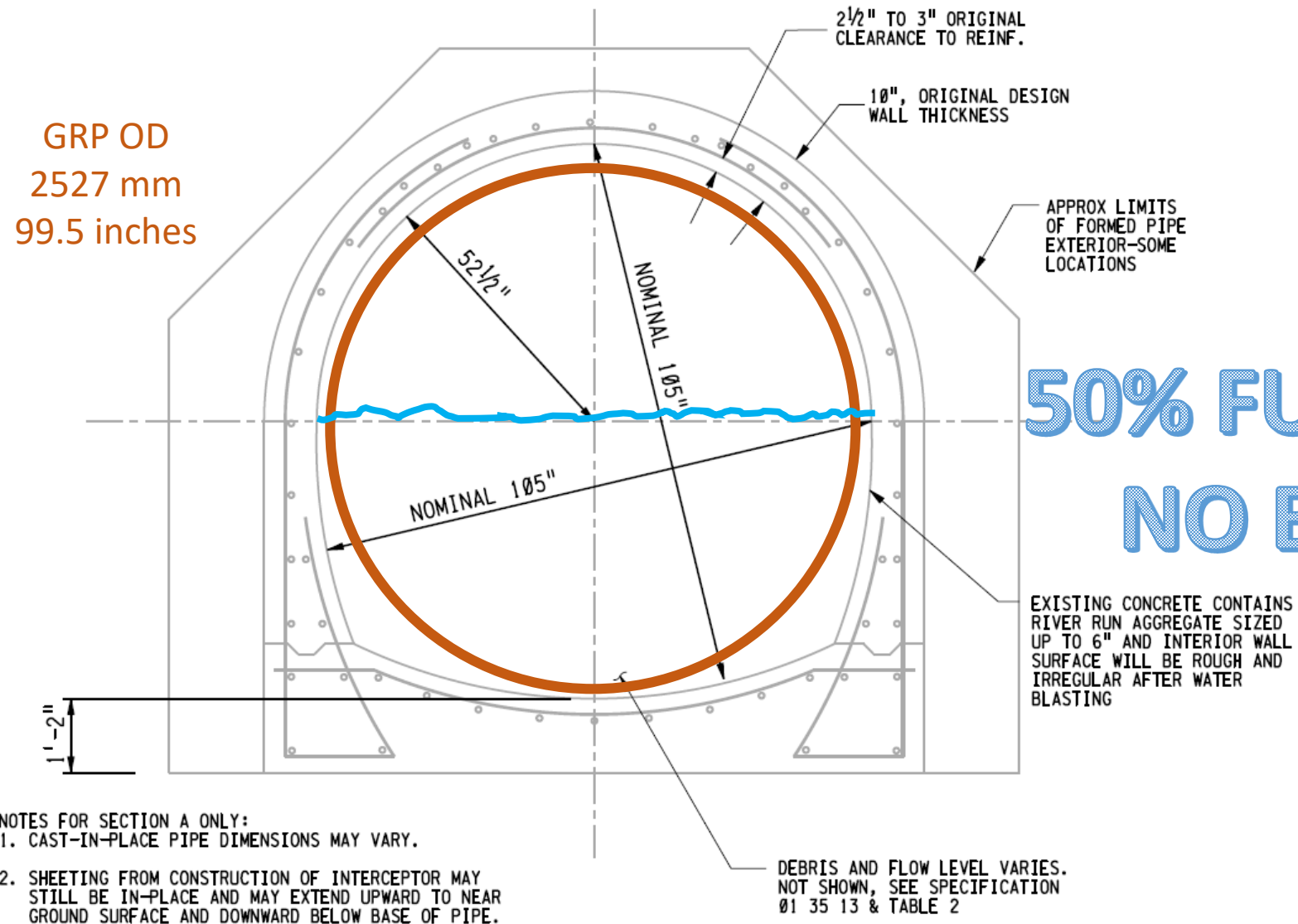
Problem at Hand (Phase 2 Scope)

- Length **1432 metres** (4,700 LF)
- Existing Pipe **2667 mm** (105 inch) Horseshoe
- 5 Access Shafts
- 2 curved 45-deg turns
- Liner Pipe 2420 mm (96-inch) ID GRP (FRPM)
- Allowed 2 years to complete
- Mladen Buntich Construction (Upland, California)
- \$12,516,000 total construction bid

Problem at Hand (Phase 2 Flow)



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HOST PIPE ID
2667 mm
105 inches

**50% FULL FLOW
NO BYPASS**

NOTES FOR SECTION A ONLY:
1. CAST-IN-PLACE PIPE DIMENSIONS MAY VARY.

2. SHEETING FROM CONSTRUCTION OF INTERCEPTOR MAY STILL BE IN-PLACE AND MAY EXTEND UPWARD TO NEAR GROUND SURFACE AND DOWNWARD BELOW BASE OF PIPE.

DEBRIS AND FLOW LEVEL VARIES.
NOT SHOWN, SEE SPECIFICATION
Ø1 35 13 & TABLE 2

Various Trenchless Solutions (varie soluzioni trenchless)

VARIOUS TRENCHLESS SOLUTIONS

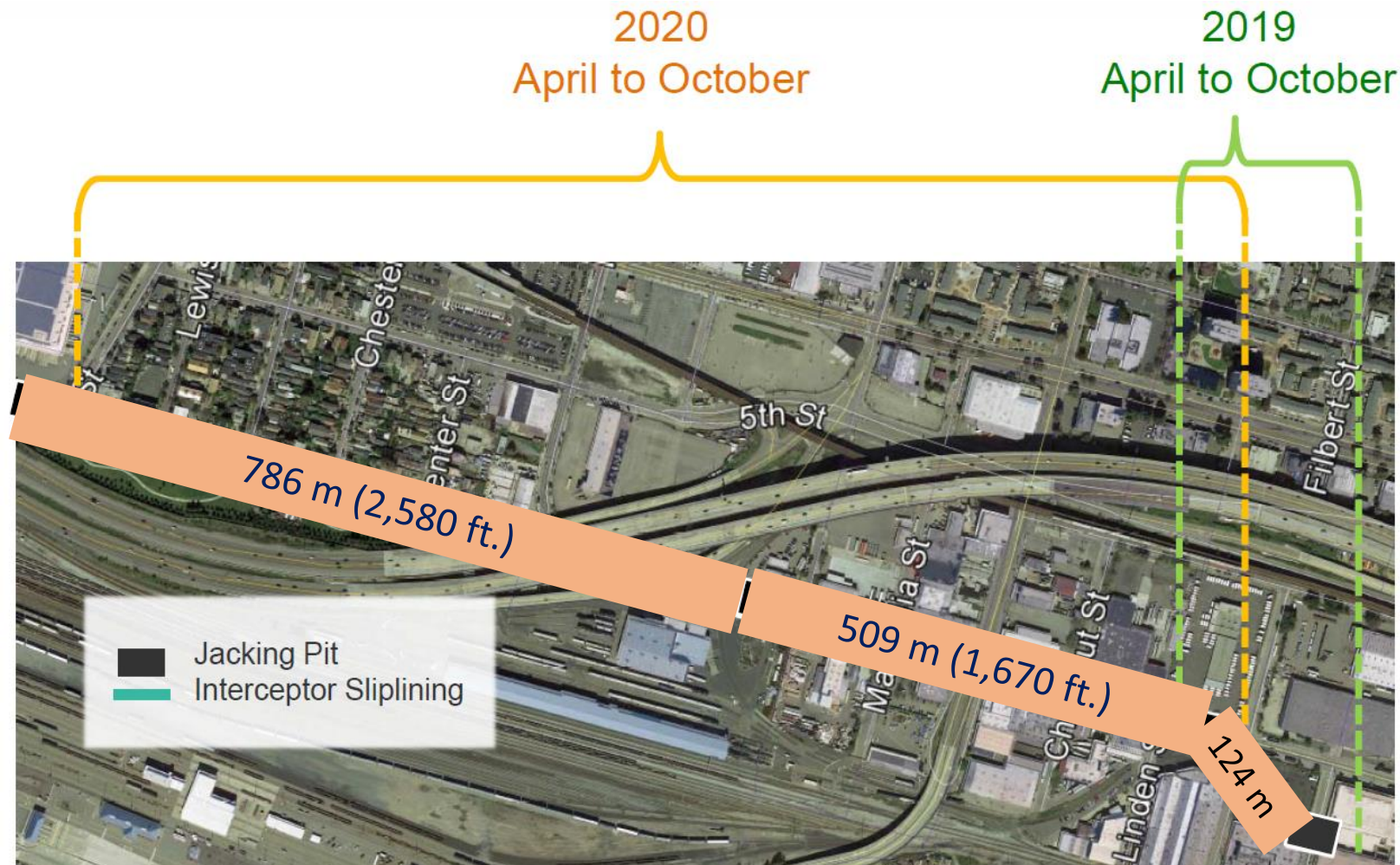
Varie Soluzioni Trenchless

Various Trenchless Solutions



- Agency has used
 - CIPP for small diameter Rehab (needs bypass pumping)
 - Spiral Wound in small diameters and short runs (low flow only)
 - Has used man-entry PVC sheet liners
 - Night work
 - Low flows only
 - Slow installation
 - Cost prohibitive
 - Live flow sliplining with 1350 mm (54 inch) GRP in 2017

Various Trenchless Solutions



Various Trenchless Solutions

- Man-entry mastic PVC sheet liner
 - **Wood Street Sewer Rehab (2002)**
 - Slow process - 7 metres per day production
 - Limited hours - 23:00 to 04:00 next morning
 - Full flow everyday
 - **3rd Street Sewer Phase 1 Rehab (2016)**
 - Repaired 100 metres of Wood Street
 - Fell behind by over 1 year due to wet conditions
- None Man-entry sliplining with GRP pipe
 - **3rd Street Sewer Phase 2 Rehab (2019-2020)**



FINAL DESIGN

Progetto Finale

- **SLIPLINING**
 - Live Flows without any Bypass Pumping
 - Detailed RedZone survey prior to bidding
 - Using Mechanized Automated Slipline Machine (REQUIRED) long-distance pushing
- **GRP PIPE**
 - Great experience in California and in EBMUD projects
 - 100 year design life
 - Available in ø3200 mm (126 inch) in USA, and ø4000 mm (156 inch) internationally
 - Hobas
 - Channeline (UAE)

MH S56
Offset 1.3 ft R

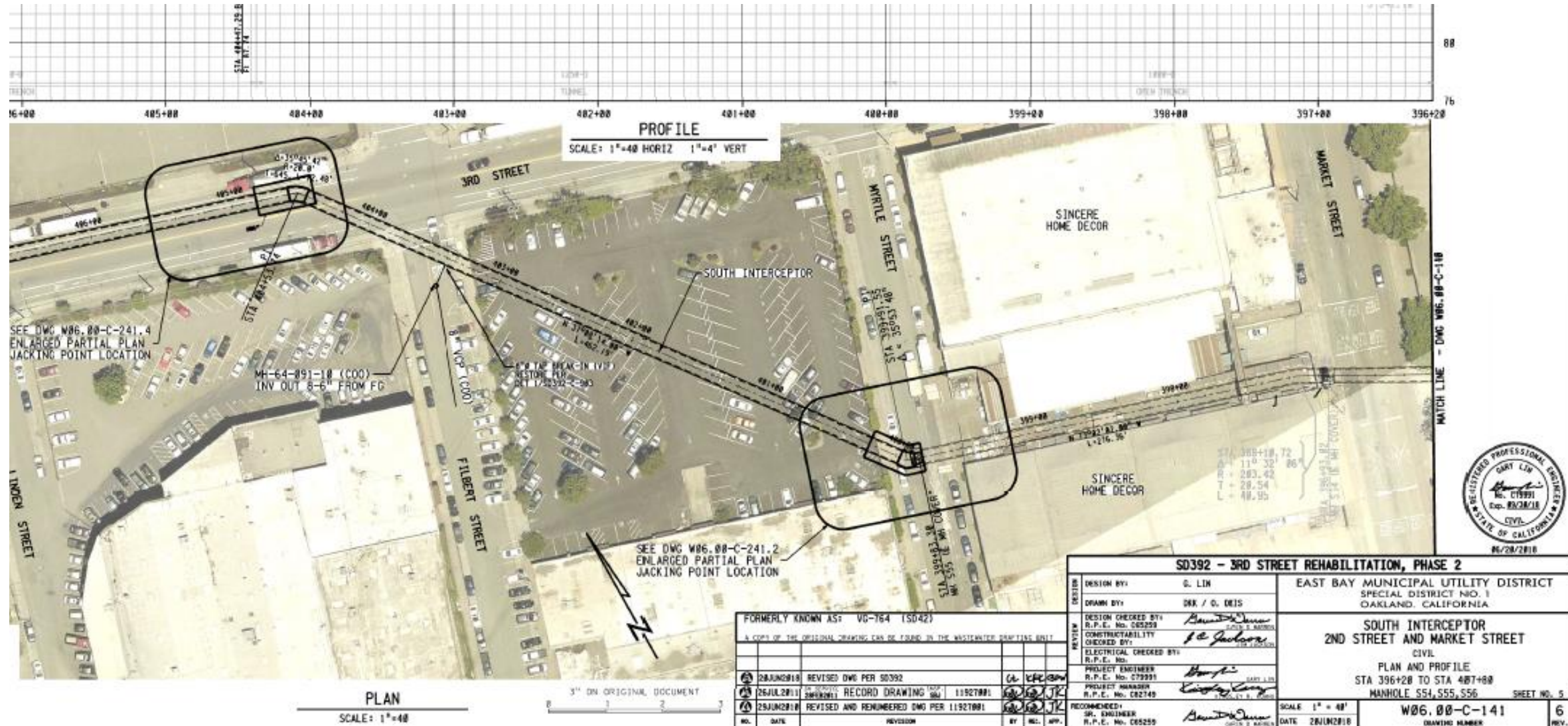


S53 TO S56

Number	Length	Angle (Deg)	Start Station	Rad (ft)	Start Northing (ft)	Start Easting (ft)
L1	4.4	N/A	0+00	N/A	2117933.44	6047028.51
C1	105.5	0.8	0+04	7196.8	2117935.46	6047024.65
L2	17.2	N/A	1+10	N/A	2117983.68	6046930.79
C2	56.4	0.6	1+27	5709.5	2117991.42	6046915.46
C3	27.6	0.3	1+83	4589.5	2118016.59	6046865.02
C4	56.4	0.5	2+11	6035.4	2118028.88	6046840.28
C5	2.1	0.3	2+67	373.5	2118053.87	6046789.75
C6	59.9	0.4	2+70	9020.2	2118054.80	6046787.84
L3	12.1	N/A	3+29	N/A	2118081.22	6046734.11
C7	192.0	2.0	3+42	5586.6	2118086.51	6046723.25
L4	32.9	N/A	5+34	N/A	2118173.61	6046552.11
C8	74.6	0.5	5+66	8786.8	2118189.03	6046523.07
C9	13.4	0.2	6+41	3354.9	2118224.28	6046457.33

MH S55
Offset 1.7 ft L

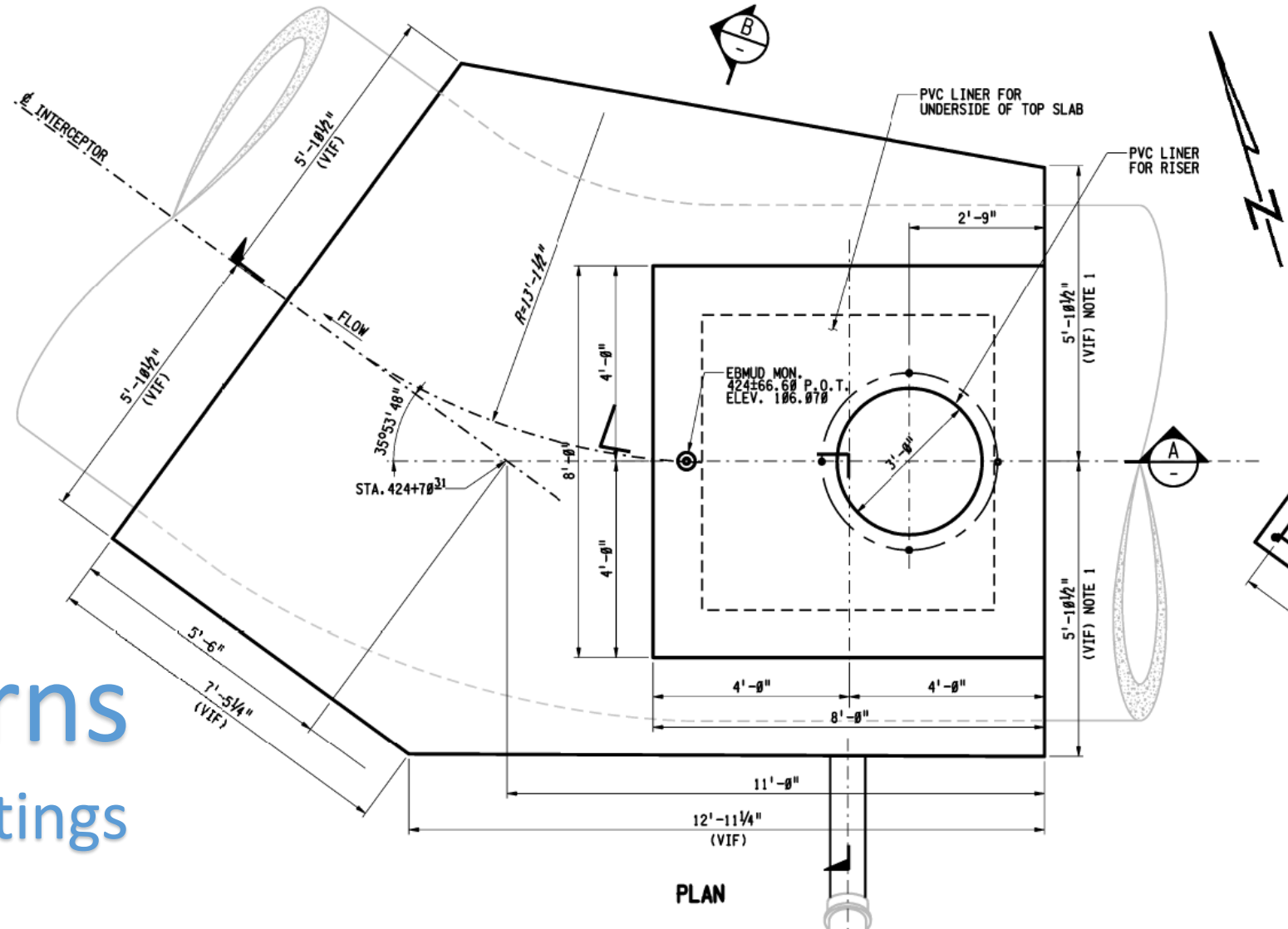
Final Design (Phase 2 Curves)



Final Design (Phase 2 Curves)

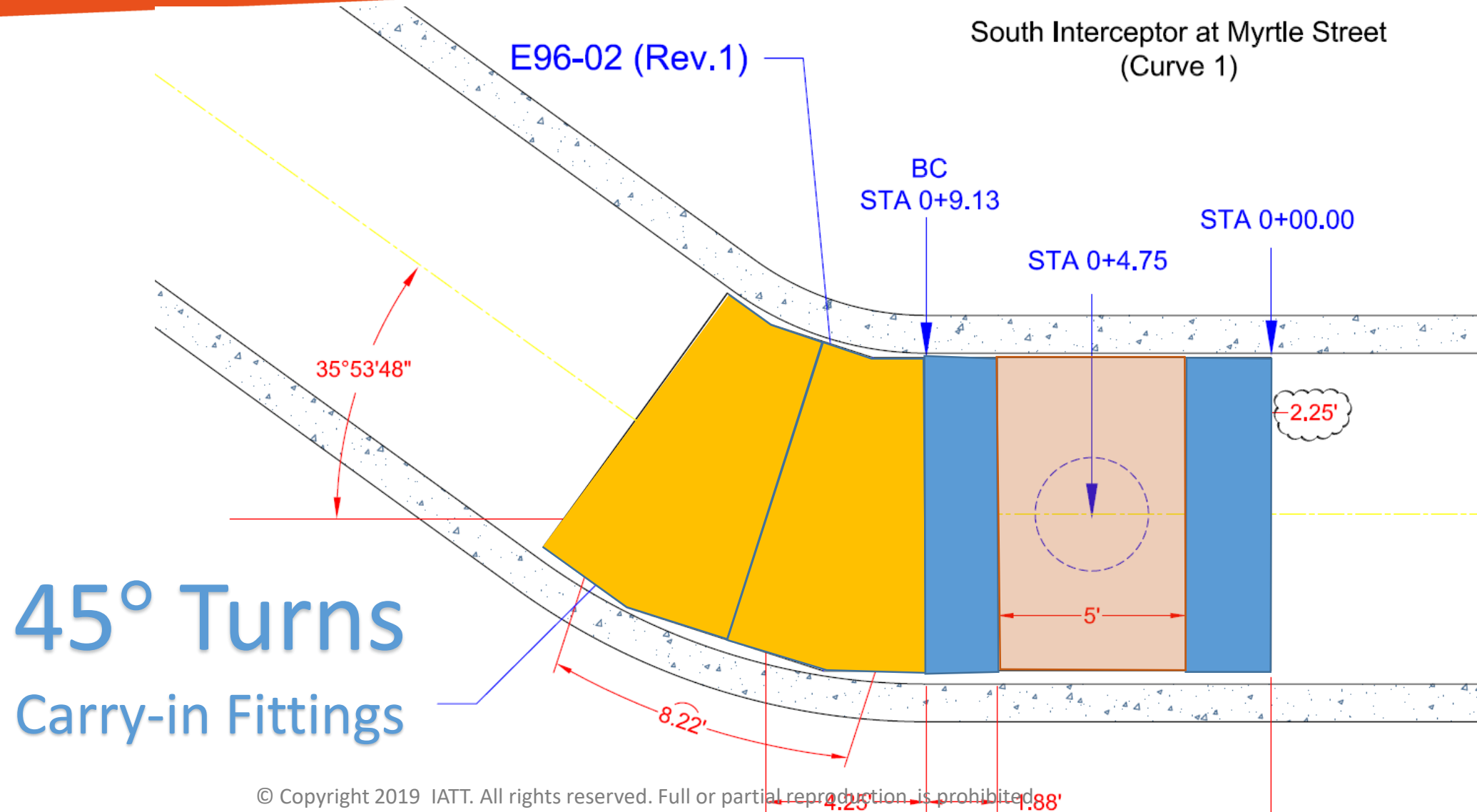


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45° Turns
Carry-in Fittings

Final Design (Phase 2 Curves)



Final Design (Phase 2 Cost)

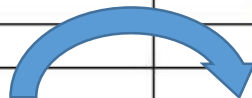
SPECIFICATION SD-392 SOUTH INTERCEPTOR 3RD STREET REHABILITATION PHASE 2

BID SUMMARY

August 22, 2018

Bid Items	Engineer's Estimate	Mladen Buntich Construction	Con-Quest Contractors	Spiniello Companies	J.R. Pipeline Co.	Kiewit Infrastructure West Co.
1		600,000	1,280,000	1,000,000	850,000	1,000,000
2		300,000	600,000	350,000	800,000	1,150,000
3		3,800,000	3,000,000	3,000,000	1,250,000	5,150,000
4		6,566,000	6,702,010	7,067,830	11,607,750	8,277,850
5		45,000	30,000	28,500	75,000	198,000
6		10,000	13,500	45,000	25,000	47,000
7		200,000	375,000	350,000	375,000	525,000
8		50,000	50,000	50,000	50,000	50,000
9		20,000	20,000	20,000	20,000	20,000
10		200,000	200,000	200,000	200,000	200,000
11		50,000	50,000	50,000	50,000	50,000
12		275,000	275,000	275,000	275,000	275,000
13		200,000	200,000	200,000	200,000	200,000
14		200,000	200,000	200,000	200,000	200,000
TOTAL FOR BID ITEMS	\$11,565,000	\$12,516,000	\$12,995,510 (\$12,745,510)*	\$12,836,330	\$15,977,750 (\$15,727,750)*	\$17,342,850

+8.2%



Bicycle Route must be maintained at all Times
(Via Addendum)





Why Trenchless Is The Best Solution!!



CONSTRUCTION DETAILS

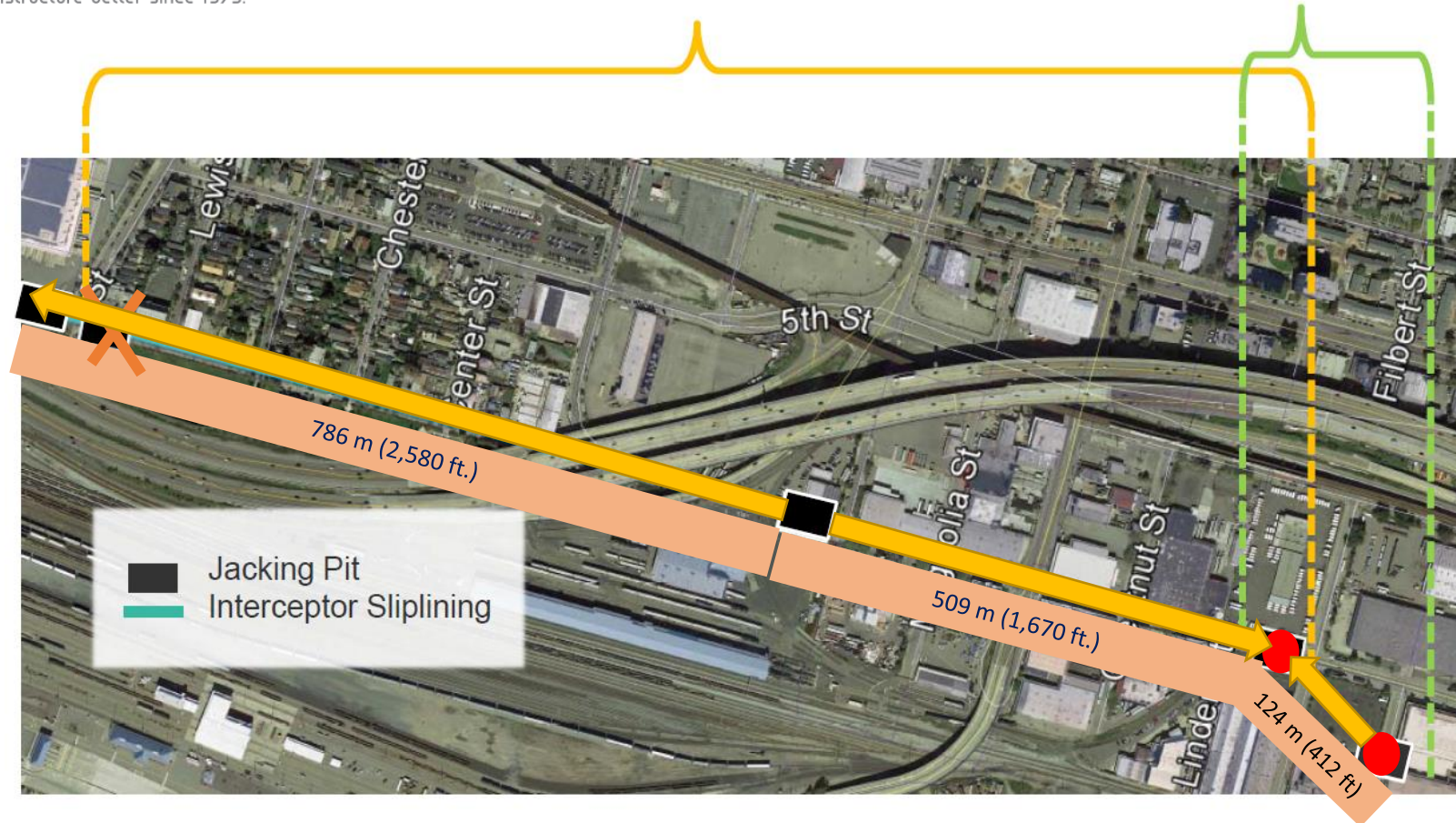
Dettagli Costrutti

Construction



2020
April to October

2019
April to October



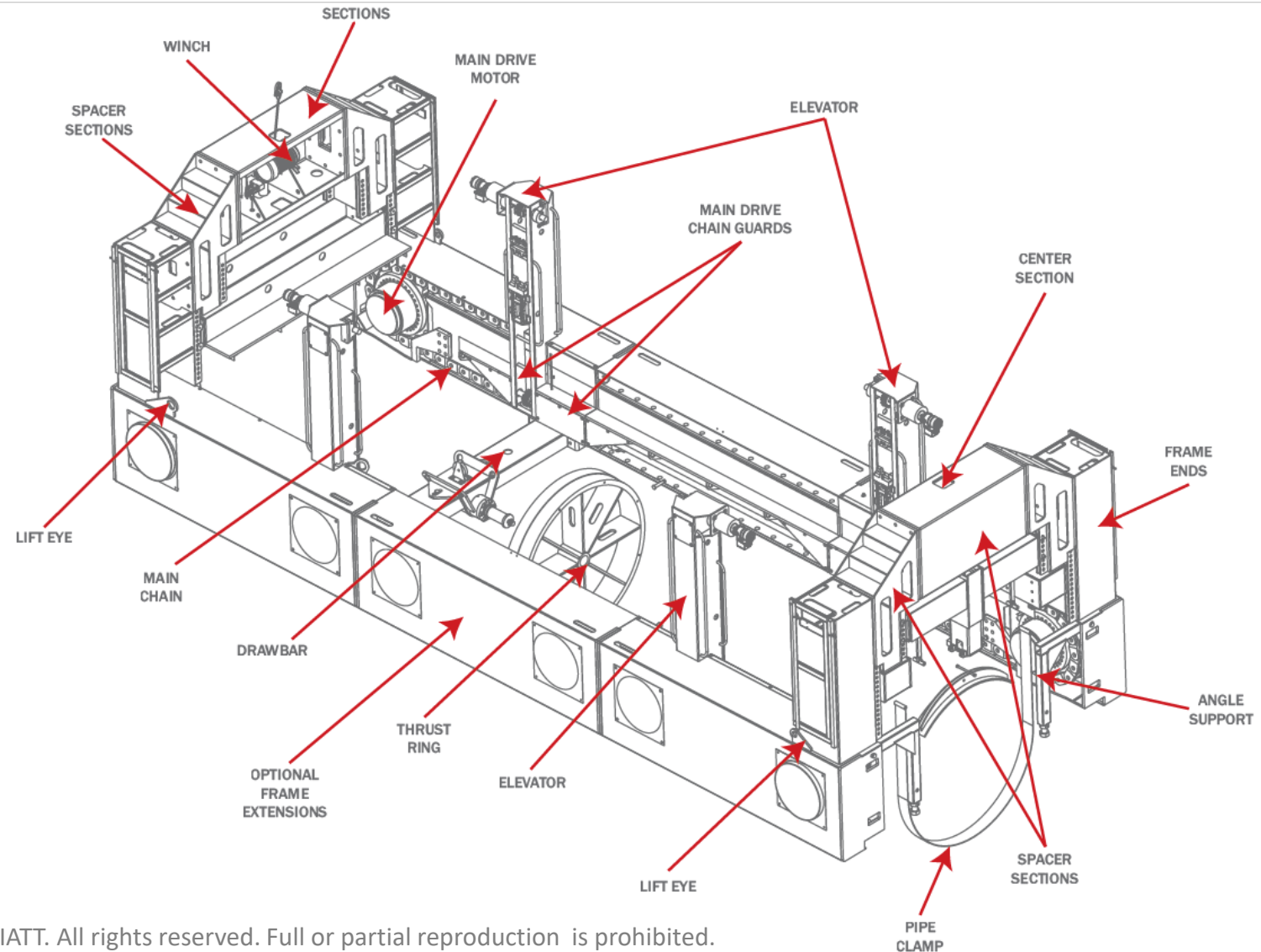
Construction (Mechanized Sliplining System)



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mladen buntich construction co. inc.
GENERAL ENGINEERING CONTRACTOR
building infrastructure better since 1975.



Construction (Mechanized Sliplining System)



Construction (Mechanized Sliplining System)



Construction (Mechanized Sliplining System)



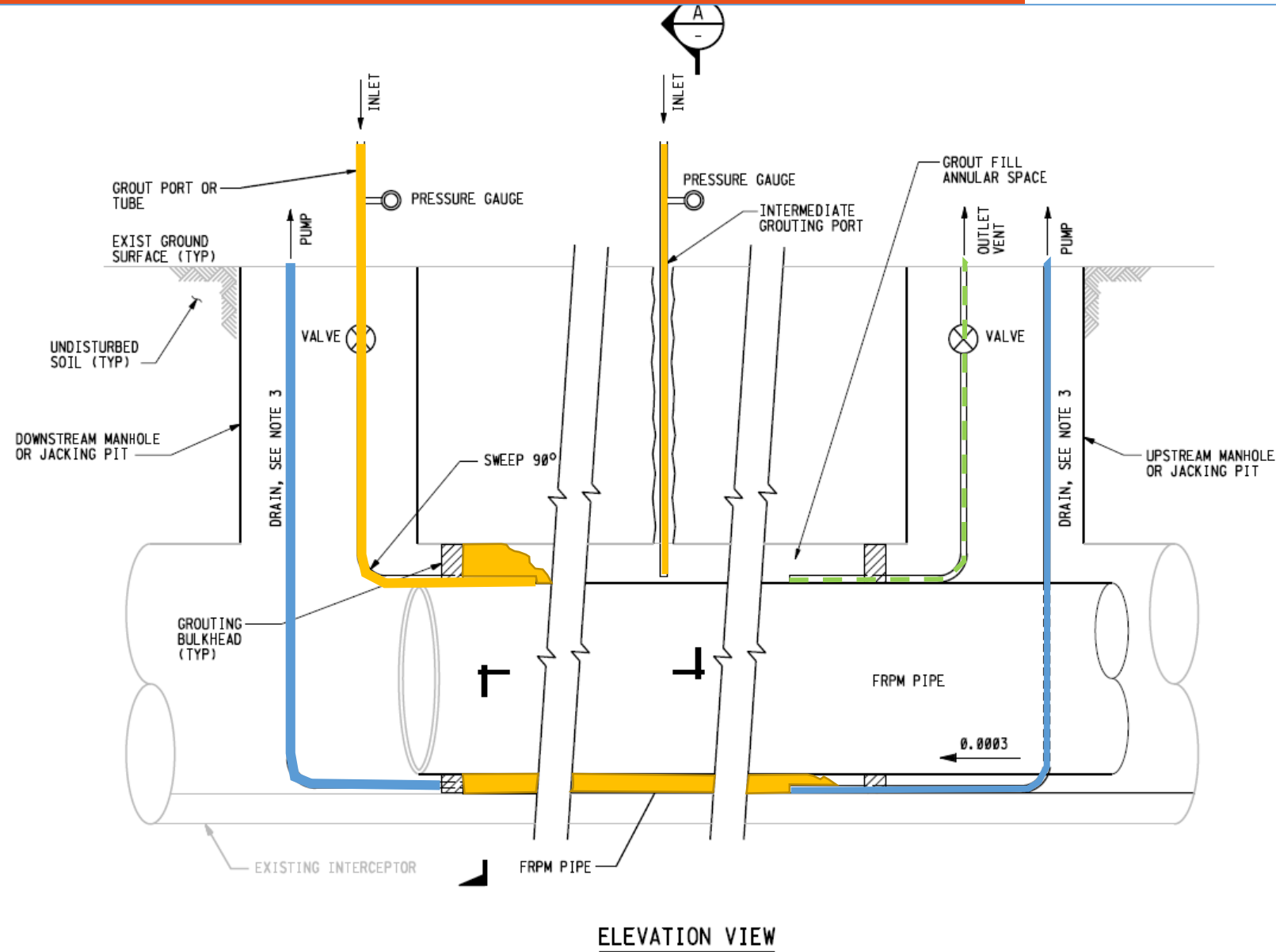
Construction



Construction (Long Distance Grouting)



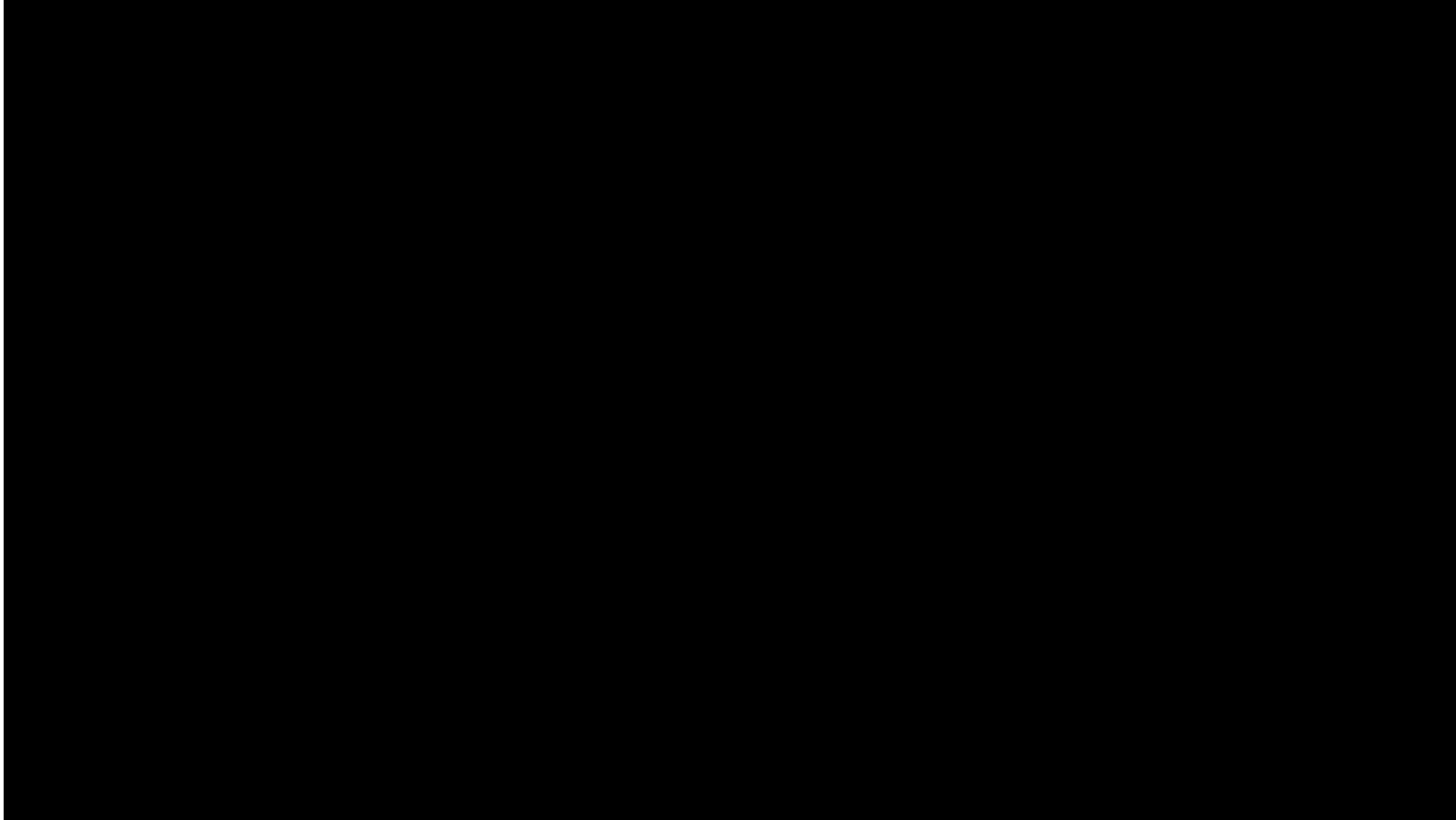
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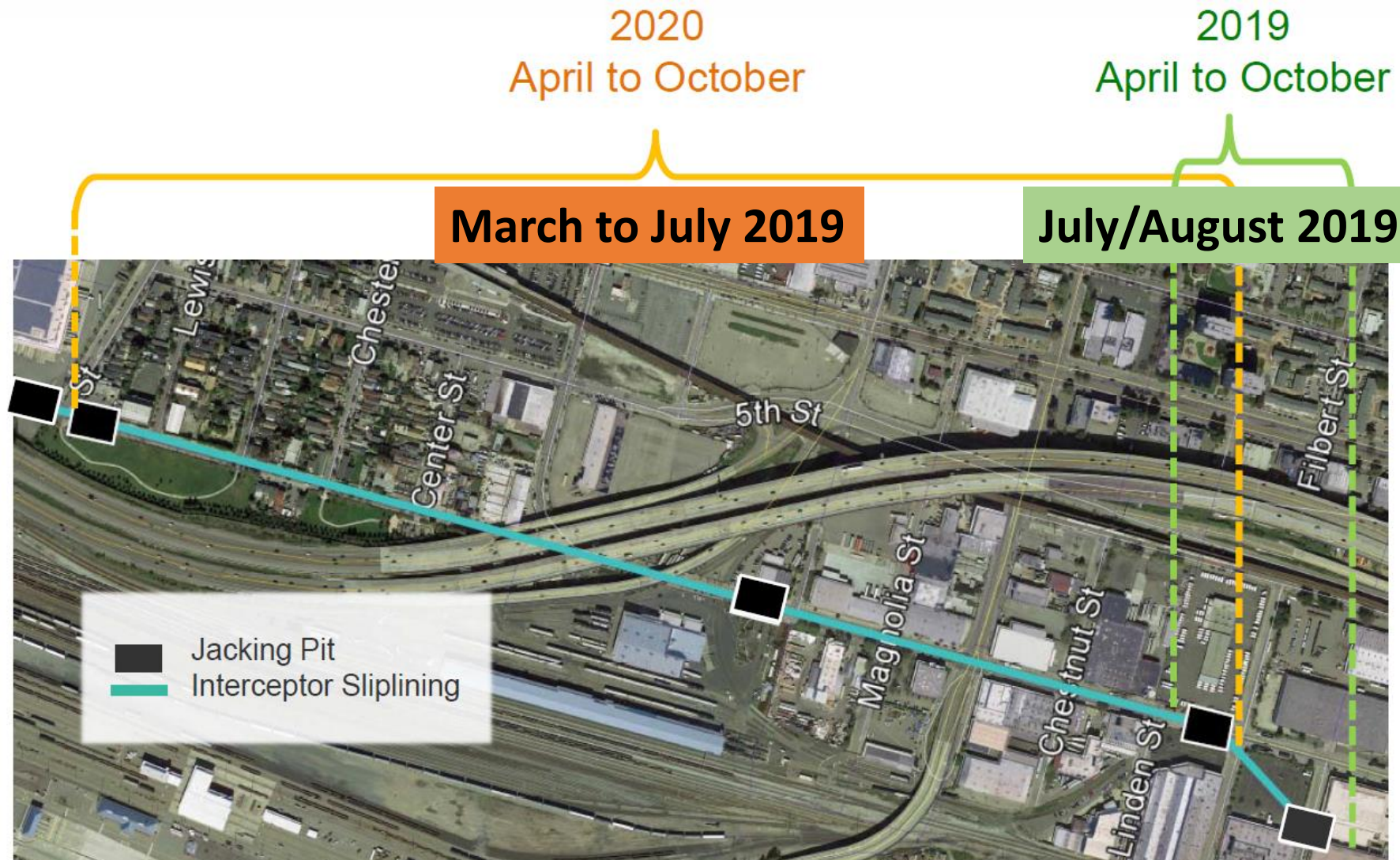
Construction



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Conclusion



Conclusion



- 2.5 days: Sliplined 786 m (2580 ft.)
- 1.5 days: Sliplined 509 m (1,640 ft.)
- 1 year ahead of schedule
- ZERO change orders were submitted
- More than 50% project cost savings: Live-flow GRP sliplining with the Akkerman Sliplining Machine

• **SET THE WORLD RECORD!!**

-
- More similar projects are underway in US and Canada

