

# History of SRP's Use of HTLS Conductors

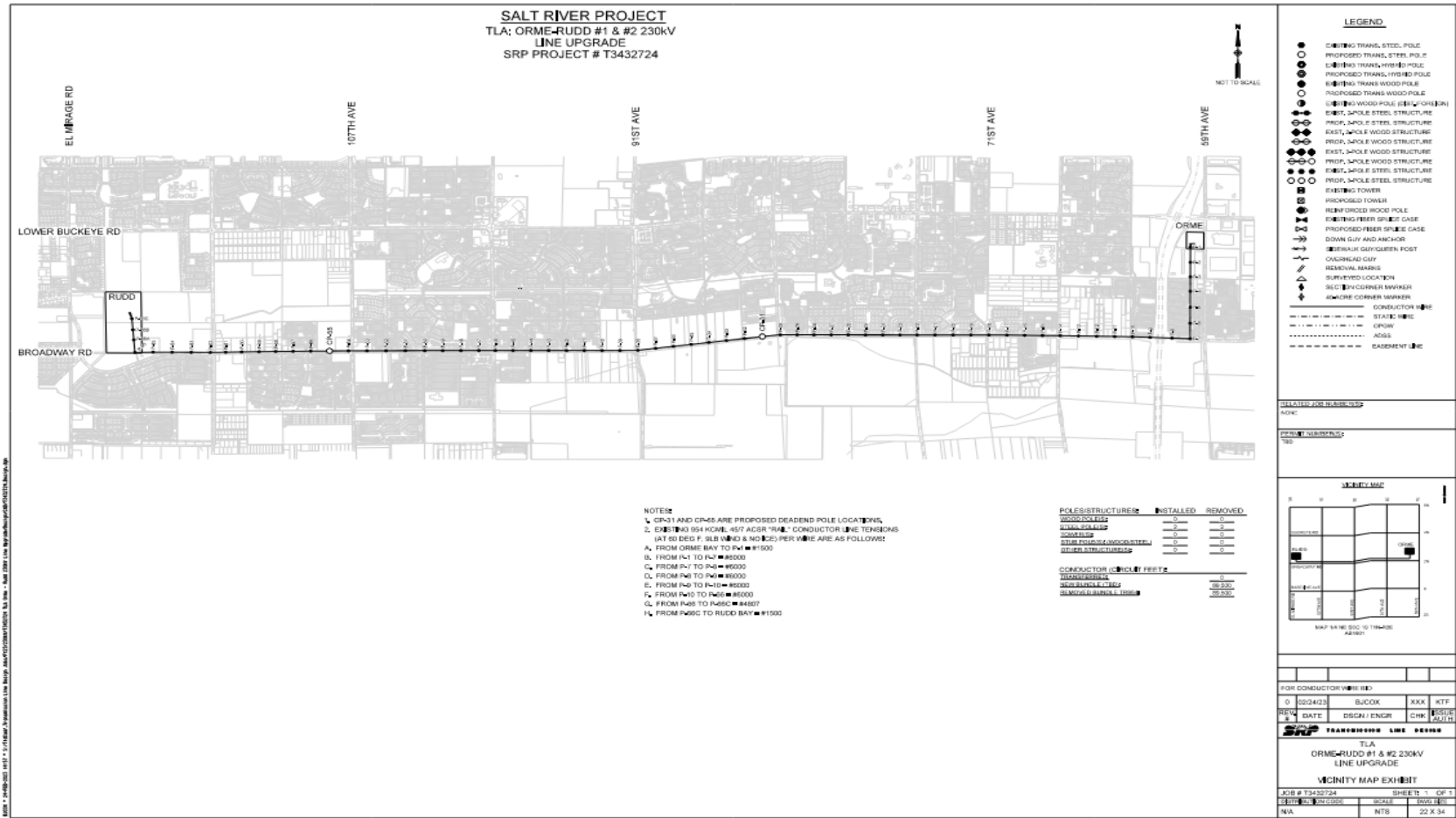
- Installed 2 spans of 3M ACCR on a 69kV gen-tie line at an SRP Generation facility.
- Installed 3 spans at 69kV of CTC core stranded by Prysmian ACCC with E3X coating.
- Evaluated HTLS conductor as a conductor upgrade option several times over the last 10 years.

# Orme-Rudd Conductor Upgrade Scope

- Existing double circuit 230kV line with 2 bundle 954 “Rail” ACSR.
- 8.5 Mile Route
- Existing Line Rating
  - 2,210A Continuous
  - 2,382A Emergency
- Transmission Planning and Analysis requested that a conductor upgrade is required and needing to achieve a rating of at least:
  - 3,800A Continuous
  - 4,180A Emergency



# Orme-Rudd Conductor Upgrade Scope



# Orme-Rudd Conductor Upgrade Scope

	Current Line 2 per phase 954kcmil ACSR (2-TR954)	Line Upgrade Requirement	2 per phase 954kcmil ACSS (2-TS954)	1 per phase 1272kcmil ACSS (1-TS1272)	2 per phase TS “ <u>Cloudveil</u> ”
Summer Normal Rating (Amps)	2210 (95°C)	3800	3660 (190°C)	2206 (190°C)	3978 (180°C)
Summer 30 min Emergency Rating (Amps)	2382 (100°C)	4180	3870 (200°C)	2370 (200°C)	4250 (200°C)
Conductor Cost			██████	██████	██████
SRP Standard Conductor Type			Yes	Yes	No
Structure Replacements			Most/All	Most/All	Few
Service Life Remaining	50 years		100 years	100 years	50 years

# Orme-Rudd Conductor Upgrade Schedule

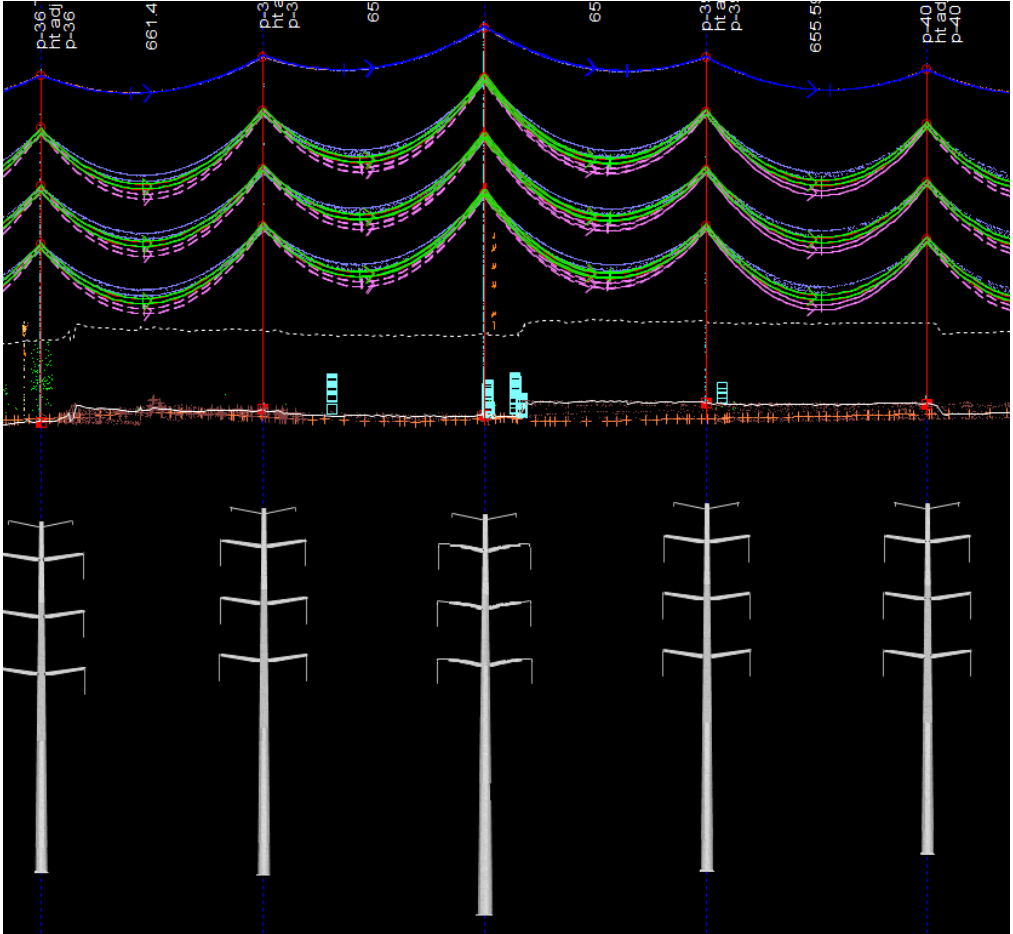
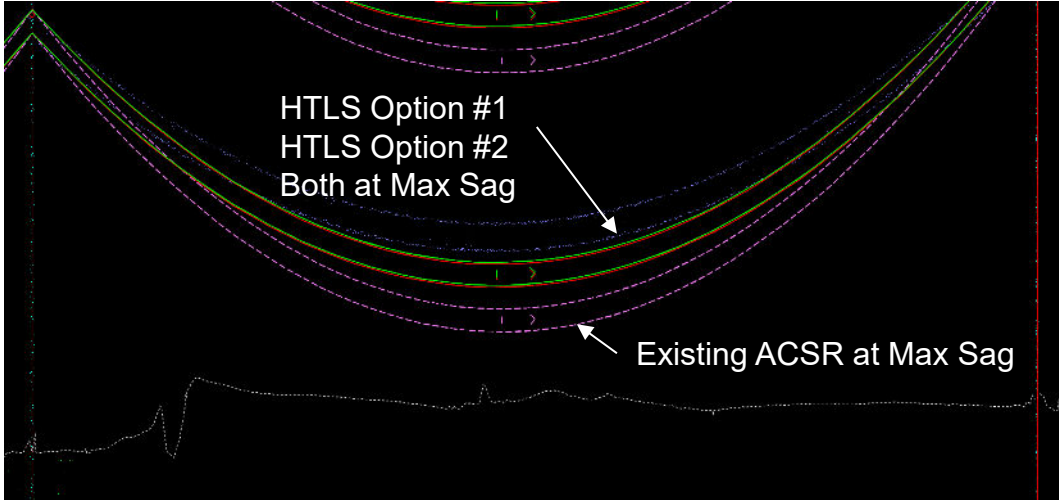
Activity/Milestone	Start Date	End Date
Survey (LiDAR, Property Survey, SUE)	October 2022	December 2022
Design	October 2022	April 2023
Material Procurement	January 2023	January 2024
Construction	January 2024	May 2024

# Request for Proposal and HTLS Conductor Evaluations

- SRP Issued an RFP to several HTLS manufacturers
- SRP's evaluations included
  - Meets our project specifications
  - SRP design, engineering and construction approves of the cable technology
  - Cost
  - Schedule
- Testing
  - Vibration testing
  - Full tension compression testing
- TS Conductor "Cloudveil" 1182 kcmil 24/1 ultimately selected by SRP

# Design Highlights

- HTLS had less final sag compared to ACSR at same tension (as expected)



# Design Highlights

- Selection of Hardware
  - Partnered with AFL
  - Suspension Assembly GSA vs Hibus cushion grip
  - Purchase of compression presses
  - Vibration dampers
  - Compression sleeves – Deadend and Full-tension splices
- Optimized pulling sections and minimized conductor waste/scrap with custom reel lengths.



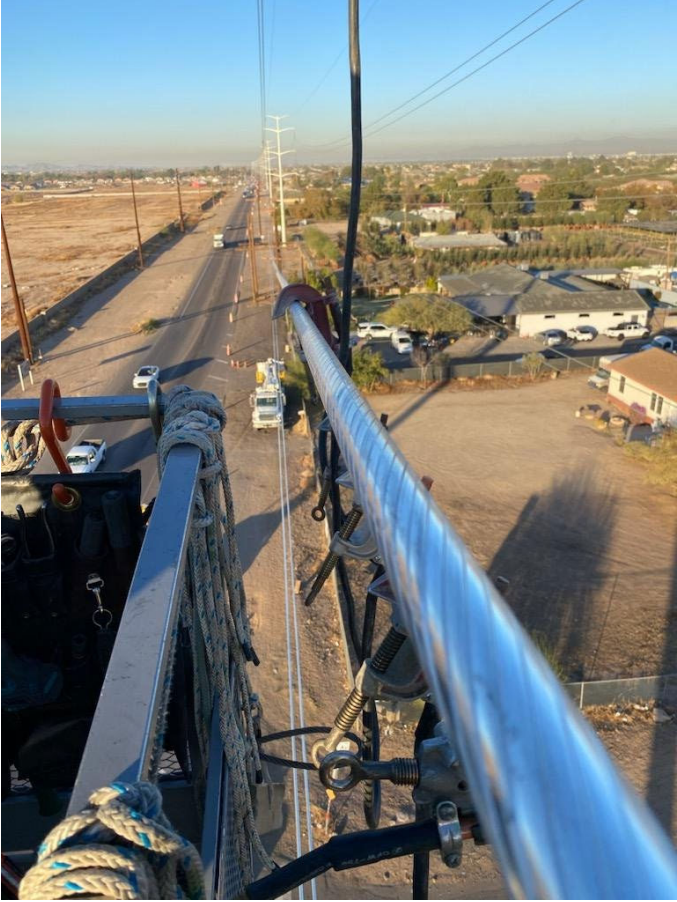
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# Construction Highlights



# Conclusion

- Overall, SRP's experience working with TS Conductor was positive.
- Orme-Rudd 230kV re-conductor project was the first HTLS installation at this scale for SRP.
- Hardware fittings lessons learned.
- Managing contingency and maintenance material stock – be strategic on deploying different technologies
- SRP is currently in the process of incorporating HTLS into standards.
- Transmission Line Design considers TS Conductor “Cloudveil” as a proven HTLS solution for our system.