# Digital Redlines Proposal

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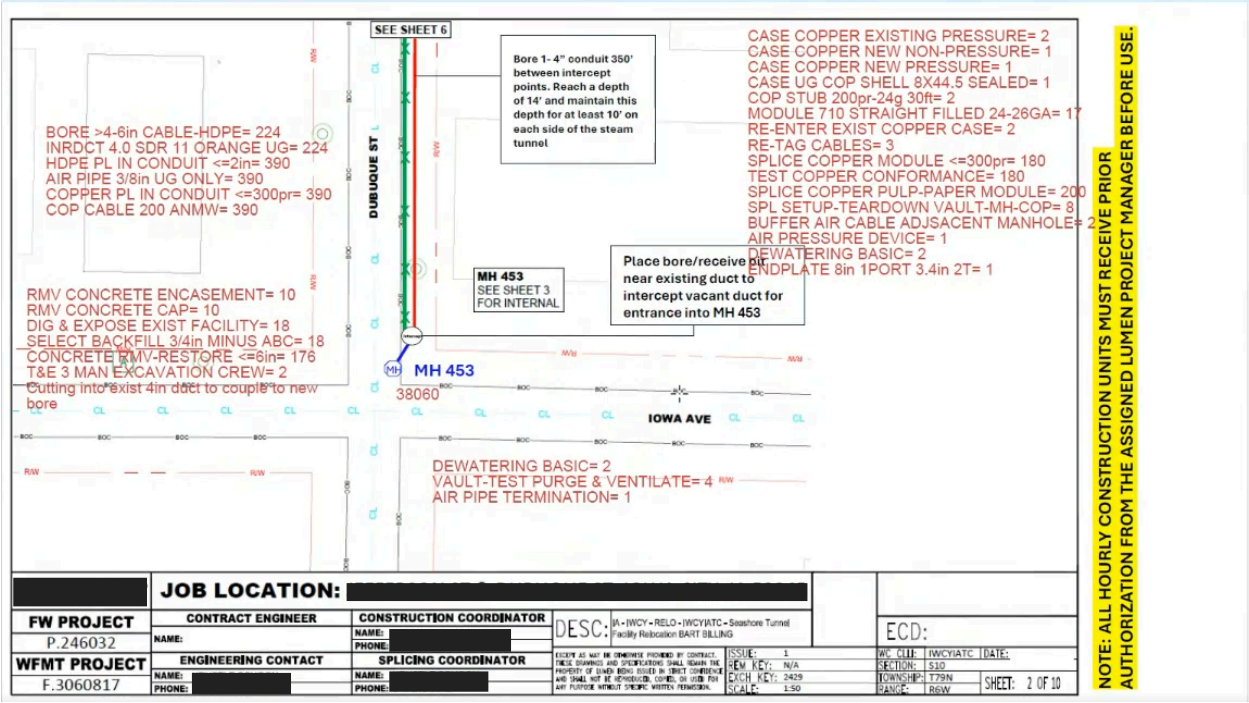
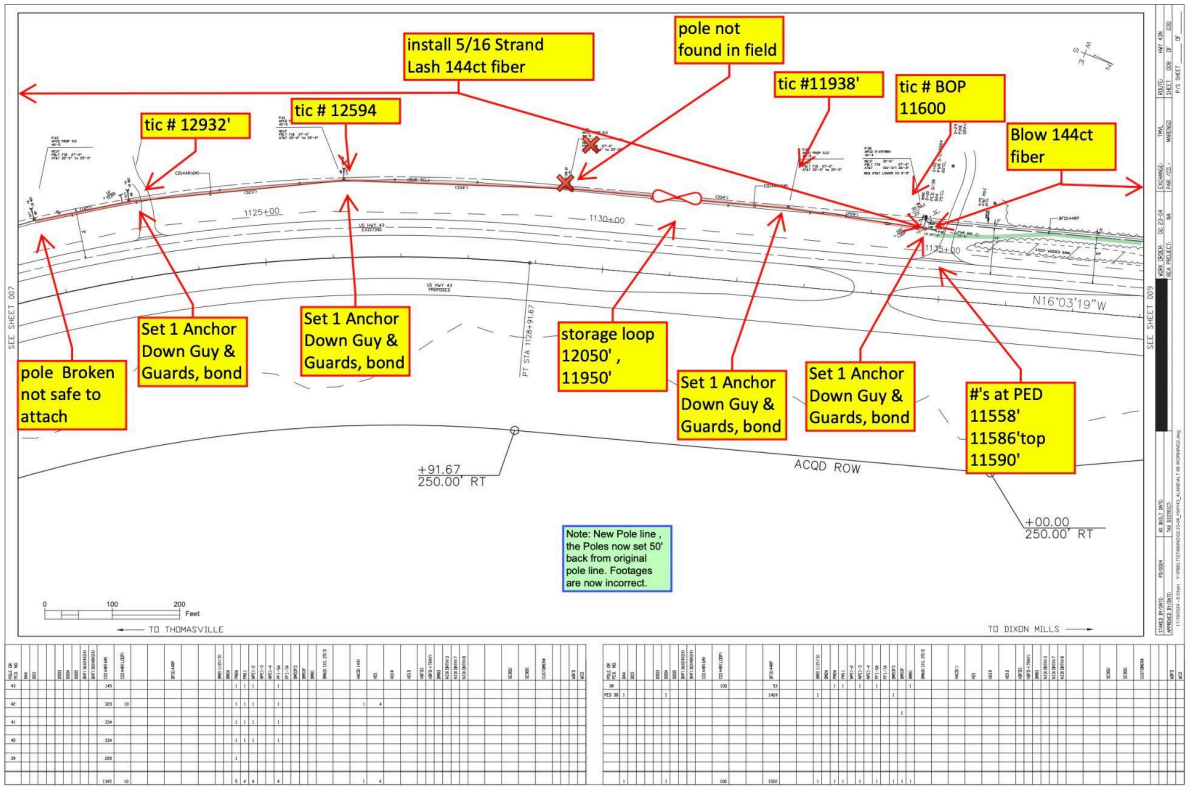
# Introduction

The goal of this software is to streamline the construction documentation process. It replaces physical redlining on paper prints with a digital solution, ensuring accurate and readable capture of installed units and other performed work.

# Definitions

CIP - Change in Plans
CUP - Construction Unit Plant
DSR - Daily Status Report


SEE SHEET 6
Bore 1- 4" conduit 350' between intercept points. Reach a depth of 14' and maintain this depth for at least 10' on each side of the steam tunnel
CASE COPPER EXISTING PRESSURE= 2
CASE COPPER NEW NON-PRESSURE= 1
CASE COPPER NEW PRESSURE= 1
CASE UG COP SHELL 8X44.5 SEALED= 1
COP STUB 200pr-24g 30ft= 2
MODULE 710 STRAIGHT FILLED 24-26GA= 17
RE-ENTER EXIST COPPER CASE= 2
RE-TAG CABLES= 3
SPLICE COPPER MODULE <=300pr= 180
TEST COPPER CONFORMANCE= 180
SPLICE COPPER PULP-PAPER MODULE= 200
SPL SETUP-TEARDOWN VAULT-MH-COP= 8
BUFFER AIR CABLE ADJSACENT MANHOLE= 2
AIR PRESSURE DEVICE= 1
DEWATERING BASIC= 2
ENDPLATE 8in 1PORT 3.4in 2T= 1
BORE >4-6in CABLE-HDPE= 224
INRDCT 4.0 SDR 11 ORANGE UG= 224
HDPE PL IN CONDUIT <=2in= 390
AIR PIPE 3/8in UG ONLY= 390
COPPER PL IN CONDUIT <=300pr= 390
COP CABLE 200 ANMW= 390
RMV CONCRETE ENCASEMENT= 10
RMV CONCRETE CAP= 10
DIG & EXPOSE EXIST FACILITY= 18
SELECT BACKFILL 3/4in MINUS ABC= 18
CONCRETE RMV-RESTORE <=6in= 176
T&E 3 MAN EXCAVATION CREW= 2
Cutting into exist 4in duct to couple to new bore
DUBUQUE ST
MH 453
SEE SHEET 3 FOR INTERNAL
Place bore/receive pit near existing duct to intercept vacant duct for entrance into MH 453
MH 453
38060
IOWA AVE
DEWATERING BASIC= 2
VAULT-TEST PURGE & VENTILATE= 4
AIR PIPE TERMINATION= 1
JOB LOCATION:
FW PROJECT
P.246032
WFMT PROJECT
F.3060817
CONTRACT ENGINEER
CONSTRUCTION COORDINATOR
ENGINEERING CONTACT
SPLICING COORDINATOR
DESC.
ECD:
NOTE: ALL HOURLY CONSTRUCTION UNITS MUST RECEIVE PRIOR AUTHORIZATION FROM THE ASSIGNED LUMEN PROJECT MANAGER BEFORE USE.


install 5/16 Strand Lash 144ct fiber
pole not found in field
tic #11938'
tic # BOP 11600
Blow 144ct fiber
tic # 12932'
tic # 12594
1125+00
1130+00
1135+00
N16°03'19"W
pole Broken not safe to attach
Set 1 Anchor Down Guy & Guards, bond
Set 1 Anchor Down Guy & Guards, bond
storage loop 12050' , 11950'
Set 1 Anchor Down Guy & Guards, bond
Set 1 Anchor Down Guy & Guards, bond
#'s at PED 11558' 11586'top 11590'
+91.67
250.00' RT
ACQD ROW
+00.00
250.00' RT
Note: New Pole line , the Poles now set 50' back from original pole line. Footages are now incorrect.
TO THOMASVILLE
TO DIXON MILLS

# Problem Statement

When some portion of the work is completed, the foreman provides progress reports to his supervisors. Progress is reported through non-audited and often unorganized trails. Some communication is done via email, some via sms, and some via calls. Particularly for phone calls, there is no history of conversations.

If handwritten redlines are submitted, the supervisor needs to create a clean version of the redline manually, drafting a digital redline in Adobe PDF or another editor.

# Proposed solution - Redline

[redacted] can develop a minimal mobile app to facilitate digitization of redline data in the field.

The amount of work can be reduced if the redlines are drawn digitally the first time, instead of being re-written by a supervisor.

The solution is minimal in that it is a single-page. However, the solution can be combined with other single-page solutions in the future: whatever pages we build would just be linked with a main menu.

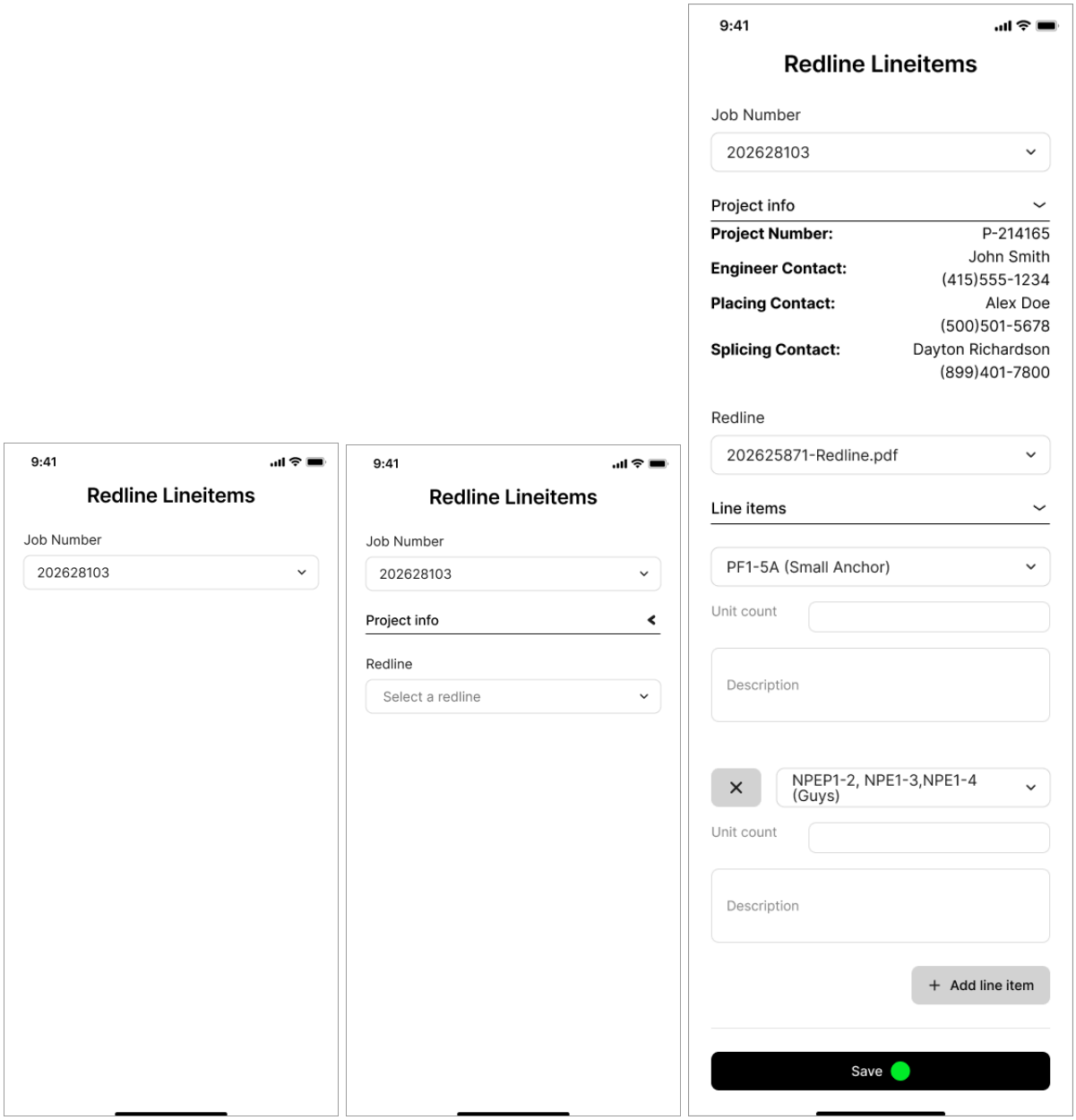
Little change to existing components is required, because SMT has an API layer for both publishing data (eg: project selector) and ingesting data (eg: redline detail). The solution can integrate with Foundation (via a scraper-crawler), Fulcrum, and any other backend.

Any page we build would still be built as a regular web page. Then, it is converted into an app with Capacitor/Electron. Capacitor/Electron embeds a browser in a mobile app, making a react-based website act as a mobile app. This is a common and popular approach. It can later be expanded with native Java bindings that allow mobile-only features (such as calling, camera, GPS) to be accessed by the embedded webpage.

The solution would include the same analytics (users per day, average time on site, etc) as is wired into SMT.

The redline data gets uploaded to SMT and attached to the selected redline.

The app addresses the common situation that there’s no connection in the field, and works offline.




Voice to text is possible (even offline). It is actually a part of the android keyboard. The second option is to use alphacep/vosk-api.git , which has similar functions but is not made by google.

Additionally, we can implement voice calling, voice messaging (if any), and sms messaging, with an in-house messaging platform. XMPP is the open chat protocol and Jabber is one of the biggest open-source servers/clients for it. Other options are Slack and Whatsapp, which allow automatic access to messages.

Additionally, we can implement canvas drawing on a pdf. This would be relatively advanced and we haven't expanded this topic in this proposal. Drawing lines, shapes, symbols, and annotations on top of a pdf is possible. We would be using paperjs, or the html canvas.

Additionally, we can implement canvas drawing on top of a map. This would be different from, and more difficult to implement, than drawing on a pdf. The map choices are openstreetmap (free) or google (negligible cost). The way of drawing on top is again paperjs or the html canvas.

## Projected KPI's

We anticipate that this mobile app would reduce the billing complexity by a month.

## Open Questions

- Why not use fulcrum then?
    - We prefer to integrate with Fulcrum as much as possible, because they have an API allowing both inputting and reading their data.
- How does data go from redlines to billing?
- [redacted] says there are project #'s different from job #'s. Can this be explained - do we care about project numbers? So far we have only the input for a job number.
- For redlines, who is responsible for the first draft of the redline notes? The foreman on the field or the supervisor in the office?
- We have an example of a pdf with redline comments pointing at specific locations on the plot.
  Does [redacted] need or want the capability to place redline lineitems onto specific points on the pdf? We can capture the x-y coord of a right-click on a pdf, to put a note on that exact spot. Otherwise, we can implement a simpler approach that only allows text line items on redlines.
- Are project fields e.g. construction coordinator per-project or per-redline?
- We're assuming that redlines now have lineitems. Is this reasonable?

# Conclusion

We can implement this single-page app in four weeks.