BP Gas Pipeline Crossing Analysis

To: Kevin Walters, CDOT

From: Nick Zoller, PE and Michelle Morgan, PE

Date: April 01, 2019

Subject: BP gas pipeline crossings along US 550

Introduction

In the area of proposed improvements for the US 550/160 Connection South, Design Build Project there are four BP crossings of these four crossings three of which are likely to be relocated. The fourth crossing at Station 862+15 will remain in place.

The design evaluated each location for potential design changes/options at each of the four known crossing locations to see if relocation could be avoided. Based on the analysis the four BP crossings, the project reference design does allow for vertical profile and drainage modifications to meet the desired clearance requirement of 5-feet with a minimum of 3-feet each of the subject crossings. In addition to the design changes the other option that can be considered, is the placement of a concrete protection slab.

US 550 Station 822+74

- Existing survey shows three existing gas pipelines crossing at a skew.
- The project reference design is shown in a cut on east side of US 550.
- A vertical profile raise is possible in this location to meet clearance requirements. A profile raise will also affect the following access roads and grading onto their property.
    - East access road onto the Weasleskin property
    - West access road onto the Snowcap Sod Farm property
    - West driveway entrance onto the Bachman property
- The roadside ditches running along both sides of US 550 should be maintained.
- The ditch running along the west side of US 550, can be conveyed in an 18-inch to 24-inch culvert under the access road. The proposed culvert will cross the existing gas pipeline and clearance requirements will need to be maintained.
- A small ditch running along the east side of US 550 may be needed to maintain roadside ditch flows from about Station 834+50 to the south.
- Gas pipelines pending relocation per BP and CDOT.

US 550 Station 843+50

- The existing survey shows one existing gas pipeline under existing US 550.
- Proposed gas pipeline extension under proposed US 550.
- The project reference design is shown in a cut.

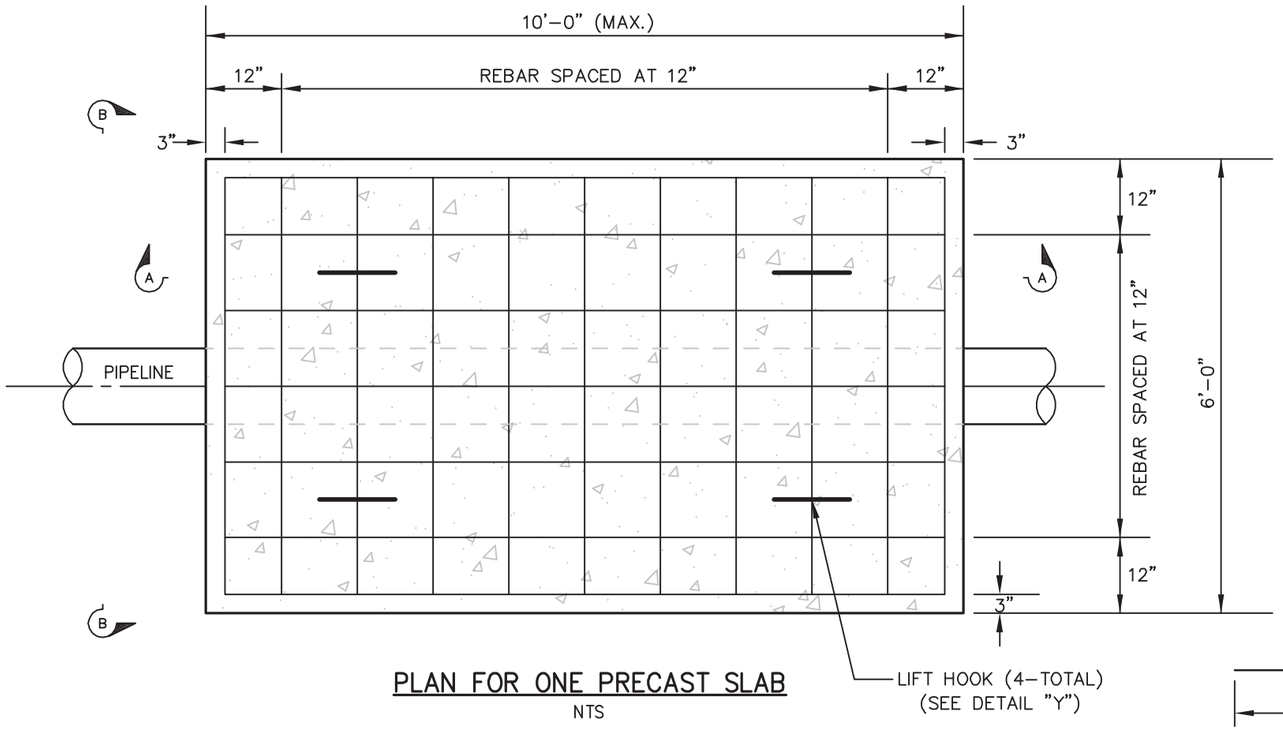
- A vertical profile raise of the reference design profile is possible in this location to meet clearance requirements.
- The proposed roadside ditch running along the east side of US 550 may not be needed. Flows can continue to sheet flow to the east.
- The existing roadside ditch running along the west side of US 550 should be maintained. This ditch might not need to be deepened based on capacity.
- Gas pipeline pending relocation per BP and CDOT.

US 550 Station 862+15 (Critical Location)

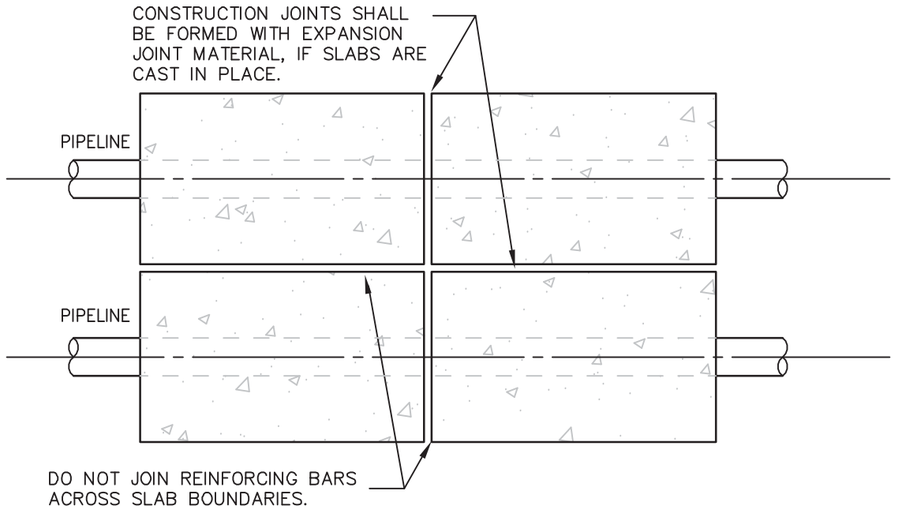
- The existing survey shows three existing gas pipelines crossing existing and proposed US 550.
- The constraints of nearby driveways and field accesses, limits the vertical profile raise.
- Clearance between existing gas pipelines and reference design median ditch is approximately 4.9-feet.
- There is a current conflict with the proposed roadside ditch running along the east side of US 550. However, this ditch can be eliminated allowing runoff to sheet flow to the east. This ditch is shown in the reference design to convey flows to a pond or sand filter for water quality treatment. Permanent water quality is not required for the US 550 project.
- The roadside ditch running along the west side of US 550 may be needed but does not appear to be an issue for the gas pipelines.
- Casing for the gas pipelines to be extended to the limits of the project ROW per BP and CDOT.

US 550 Station 899+50

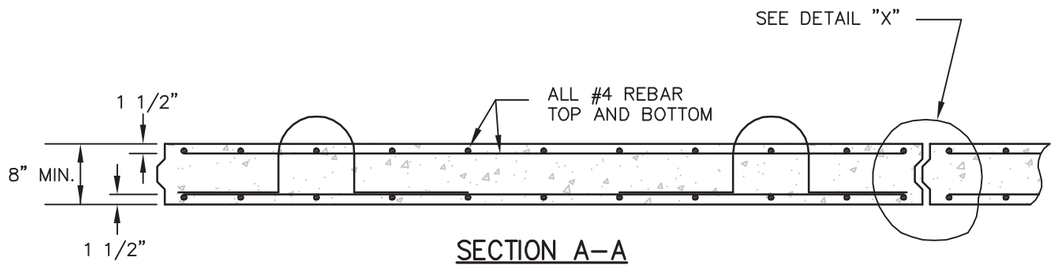
- The existing survey shows one existing gas pipeline under existing US 550 and proposed SB US 550.
- Proposed gas pipeline extension under proposed NB US 550.
- The project reference design profile is in approximately 10-feet of fill.
- Roadside ditches might not be required in this area.
- Gas pipeline pending relocation per BP and CDOT.



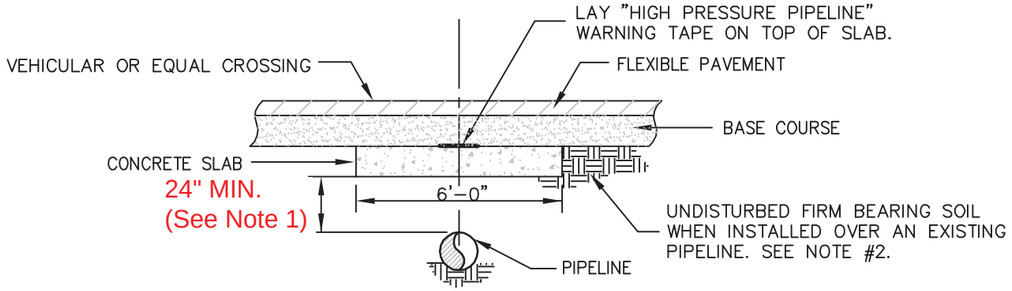
PLAN FOR ONE PRECAST SLAB
NTS



PLAN FOR TWO OR MORE SLABS
NTS



SECTION A–A
NTS



SECTION B–B
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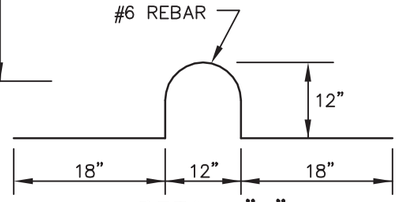
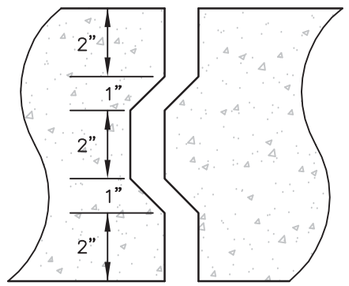


DETAIL "Y"
LIFT HOOK
NTS



DETAIL "X"
SHEAR KEY
(TYP. FULL WIDTH & LENGTH OF SLAB)
NTS

NOTES:

1. WHERE SPECIFICATIONS AND DIMENSIONS CAN NOT BE MET IN ACCORDANCE WITH THIS DRAWING STANDARD, PLANS SHALL BE SUBMITTED, PRIOR TO INSTALLATION, FOR REVIEW AND ENGINEERING APPROVAL.
   9420 W. Sam Houston Parkway North
   Room N1.217
   Houston, Texas 77064
2. SLAB INSTALLATION DESIGN IS BASED ON A MINIMUM 1400 PSF SOIL BEARING CAPACITY. WHERE INADEQUATE BEARING CONDITIONS ARE ENCOUNTERED, REFER TO ENCROACHMENT ENGINEER.
3. ALL STEEL REINFORCEMENT TO BE DEFORMED BILLET STEEL MEETING ASTM A615, GRADE 60.
4. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 P.S.I. AT 28 DAYS.
5. ALL CONCRETE FORMS, JOINT MATERIAL, WARNING TAPE AND REINFORCEMENT TO BE SUPPLIED BY CONTRACTOR.
6. SLAB WIDTH IS 6' MINIMUM OR 3 TIMES THE DIAMETER OF THE PIPE WHICHEVER IS GREATER.
7. ALL CORNERS SHALL HAVE A 3/4" CHAMFER OR FILLET EXCEPT FOR CAST–IN PLACE.
8. ESTIMATED WEIGHT OF ONE (1) 8" SLAB = 6,000 LBS.
9. DIMENSIONS ARE OUT TO OUT

MUSTANG PROJECT NO.: 14368

MUSTANG ENGINEERING, L.P.
HOUSTON, TEXAS

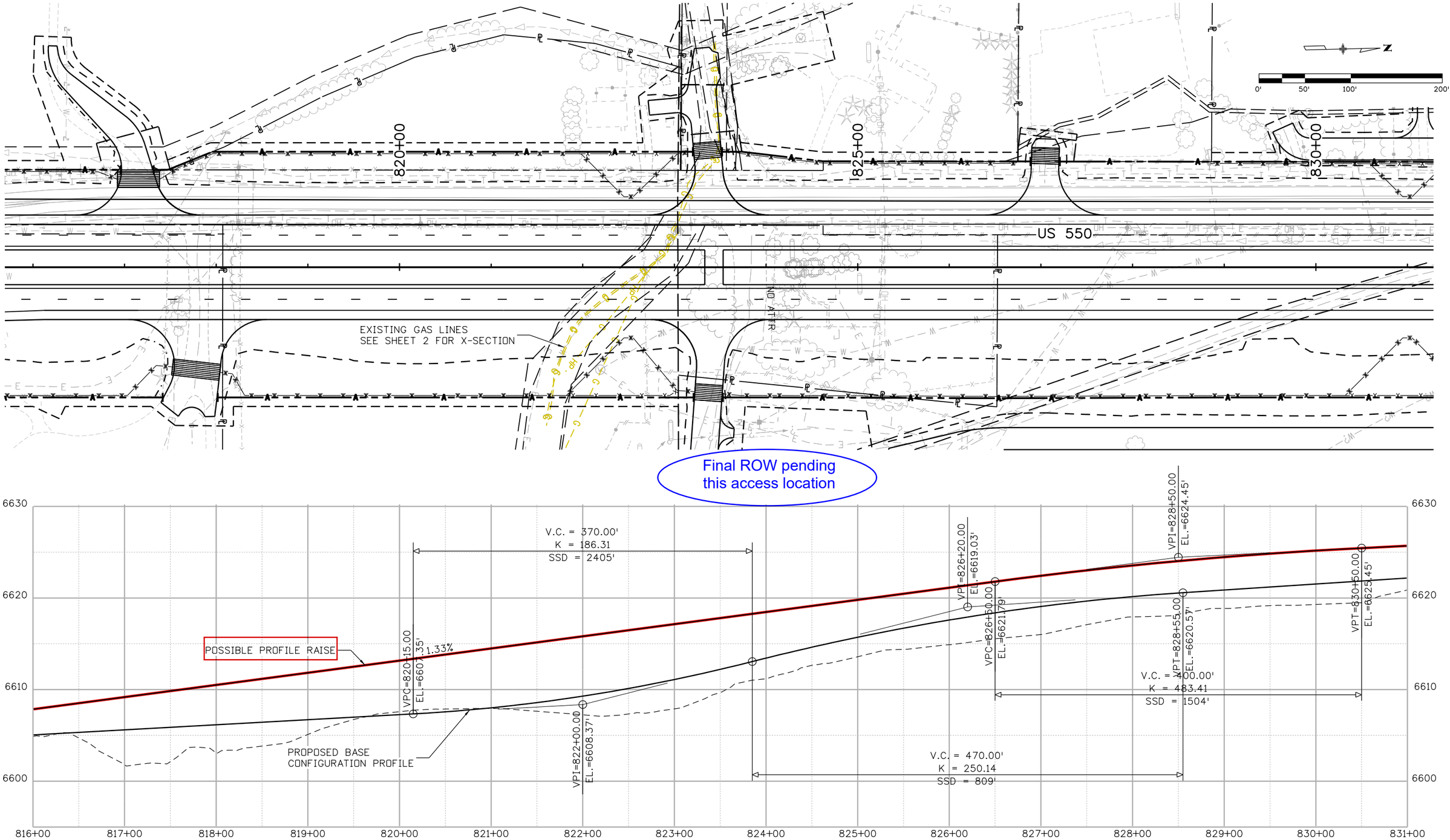
ENTERPRISE

ENTERPRISE PRODUCTS OPERATING L.P.

TYPICAL PIPELINE PROTECTION SLAB

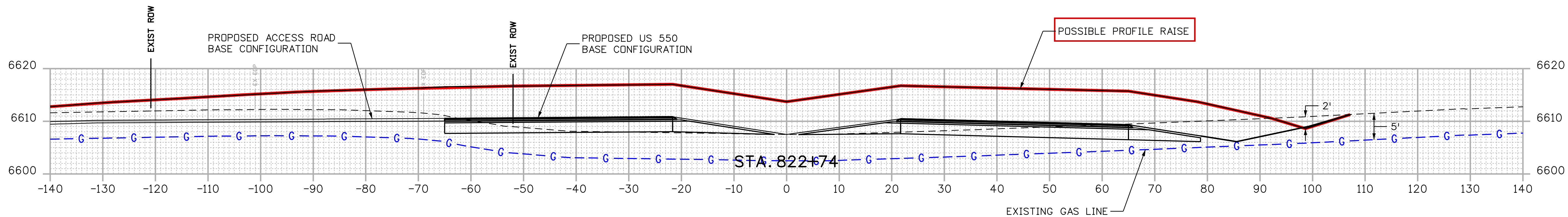
SHEET	OF
1	1

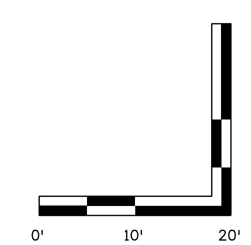
DRAWN BY	CHECKED BY	APPROVED BY	REVISION DATE	REVISION NO.	DATE	DRAWING NUMBER
WM	LH	ED SANGEL			5/25/10	14368–9903



US 550
GAS LINE CROSSINGS
822+74

DRAFT: NOT FOR CONSTRUCTION (05/22/19)

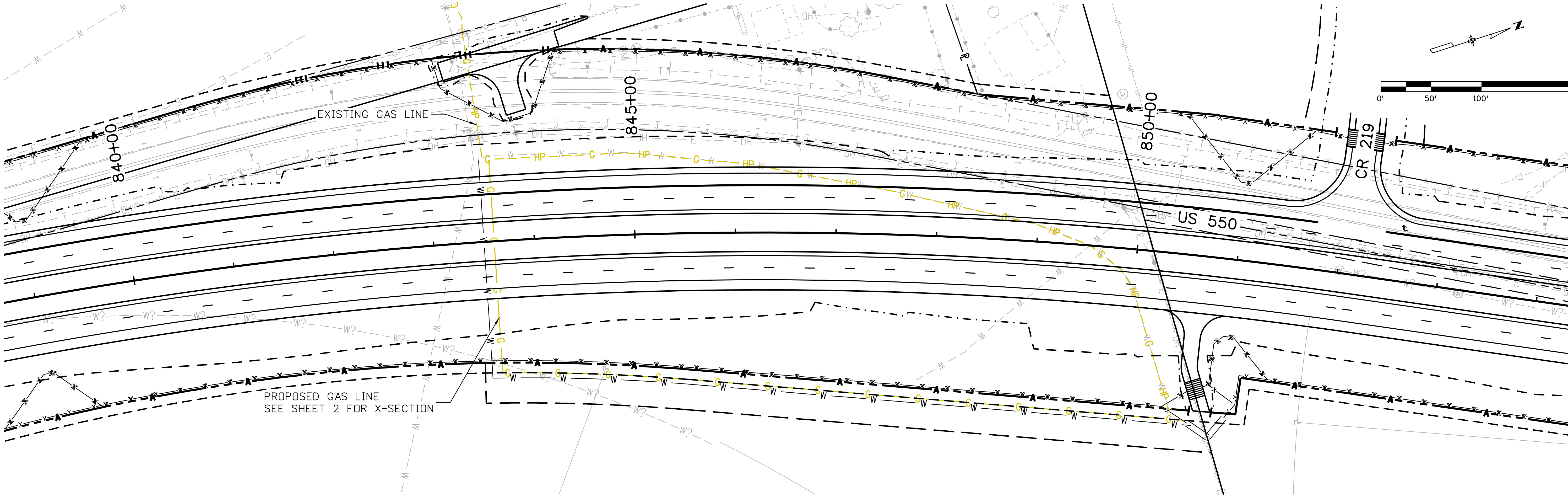


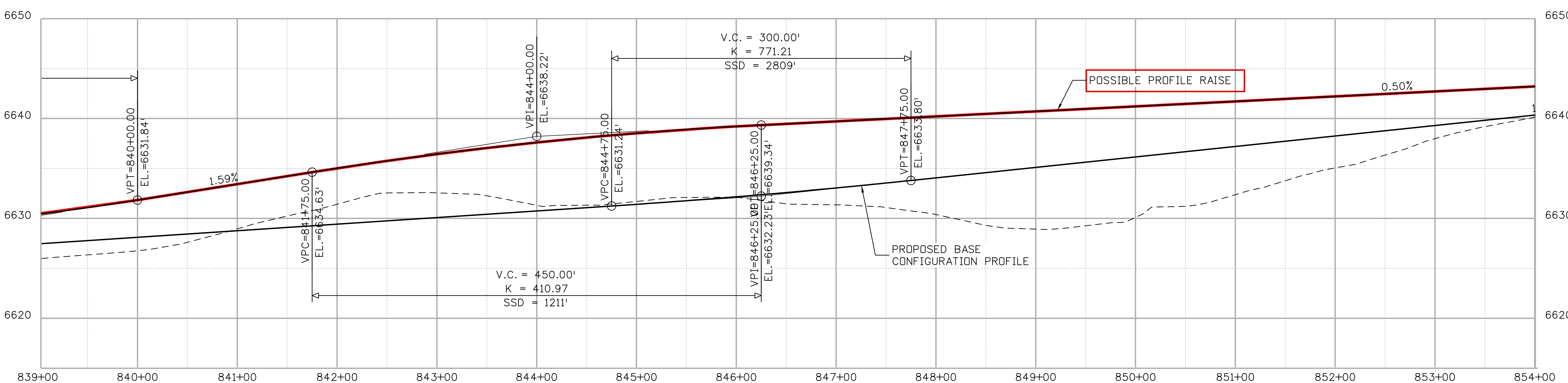


*THE BLUE LINE REPRESENTS THE TOP OF PIPE. PIPELINE DEPTHS ARE ASSUMED TO BE 5' BELOW EXISTING GROUND.

US 550
GAS LINE CROSSINGS
822+74 (2)

DRAFT: NOT FOR CONSTRUCTION (05/22/19)

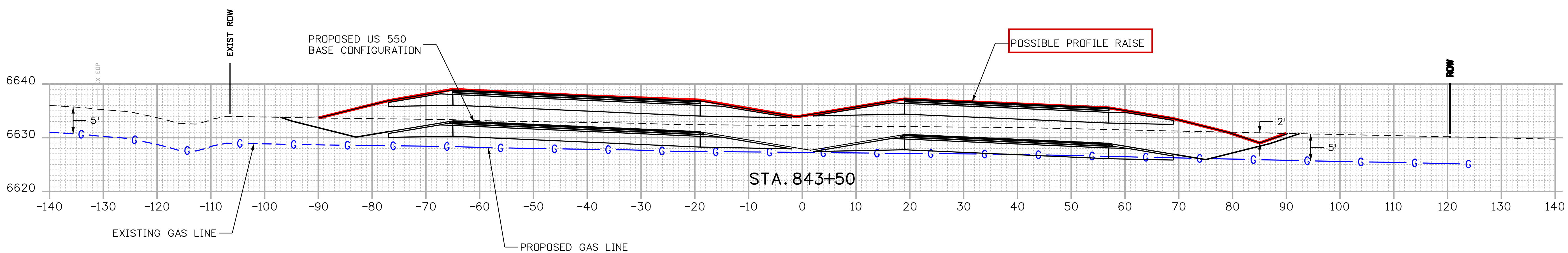




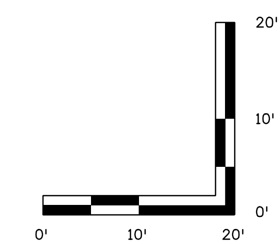
US 550
GAS LINE CROSSINGS
843+50

HDR

DRAFT: NOT FOR CONSTRUCTION (05/22/19)

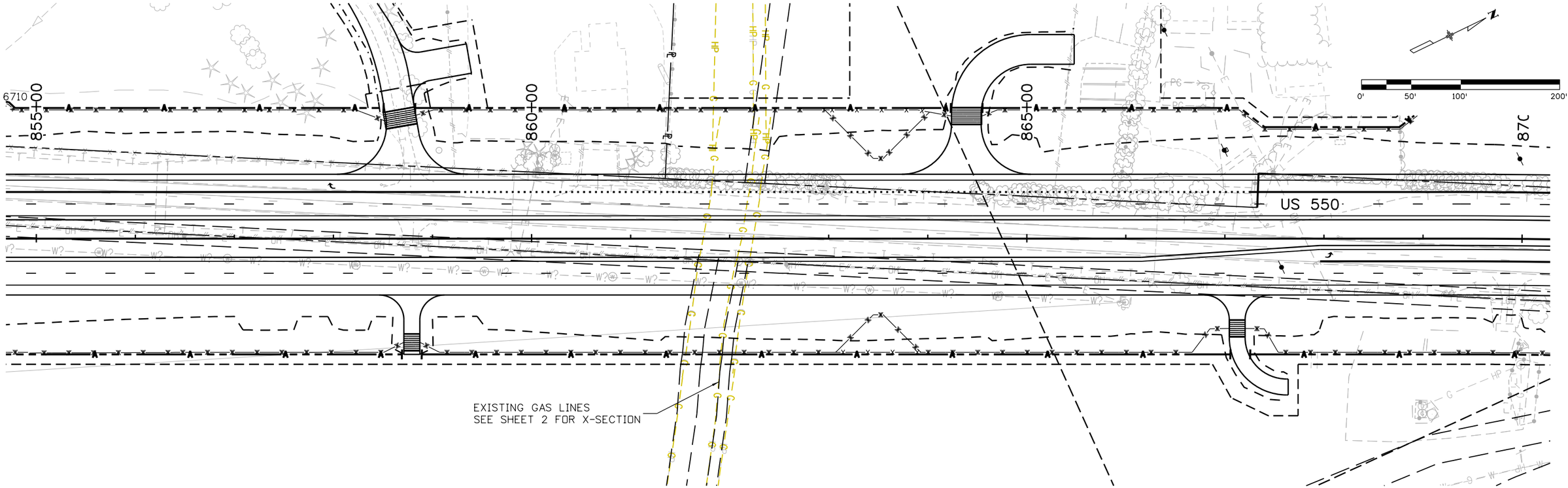


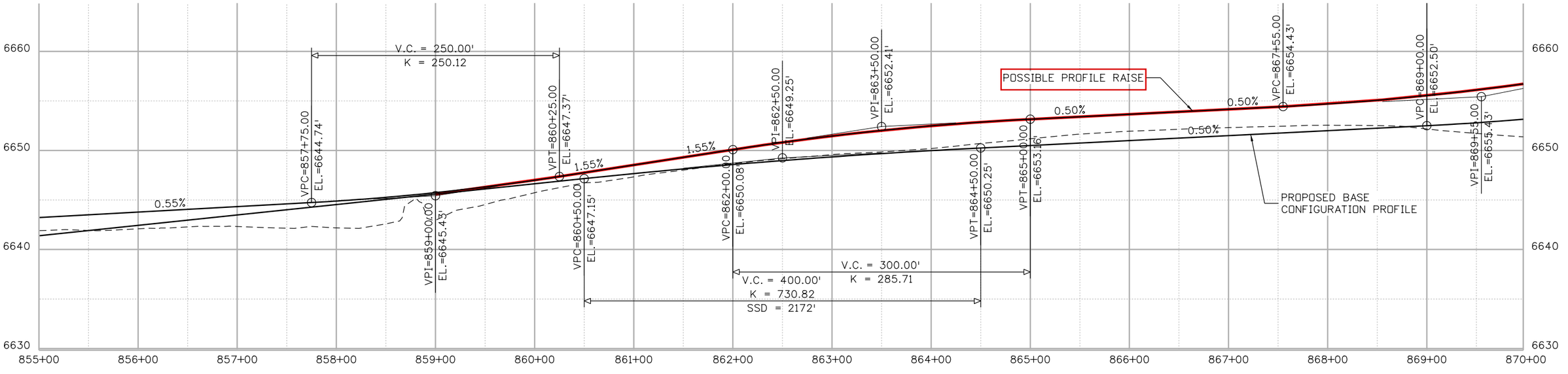
*THE BLUE LINE REPRESENTS THE TOP OF PIPE. EXISTING DEPTH IS ASSUMED AND PROPOSED DEPTH CAN BE ADJUSTED AS NECESSARY.



US 550
GAS LINE CROSSINGS
843+50 (2)

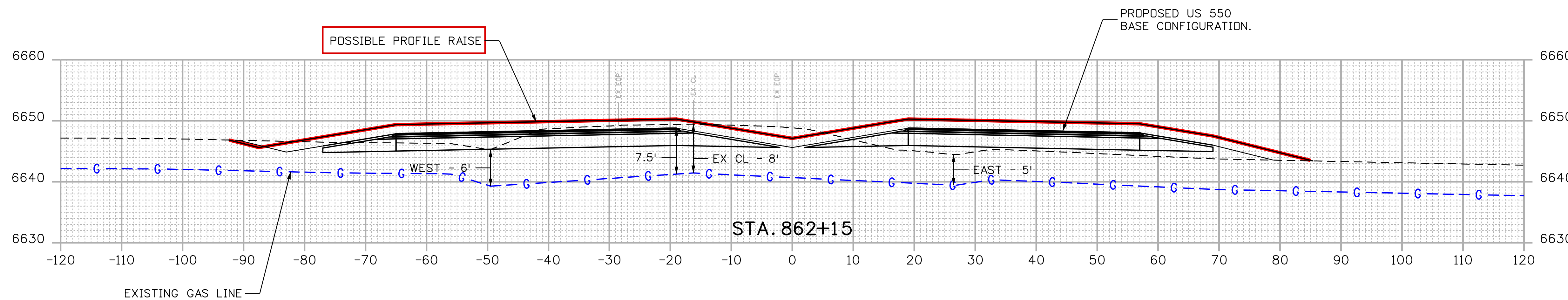
DRAFT: NOT FOR CONSTRUCTION (05/22/19)



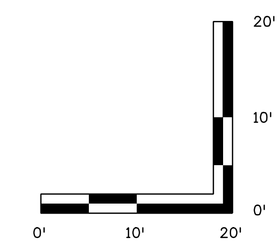


US 550
GAS LINE CROSSINGS
862+15

DRAFT: NOT FOR CONSTRUCTION (05/22/19)



THE BLUE LINE REPRESENTS THE TOP OF PIPE. THE WEST, EX CL, AND EAST DIMENSIONS WERE MEASURED IN THE FIELD.
BEYOND THESE LOCATIONS, PIPELINE DEPTHS ARE ASSUMED TO BE 5' BELOW EXISTING GROUND.



US 550
GAS LINE CROSSINGS
862+15 (2)

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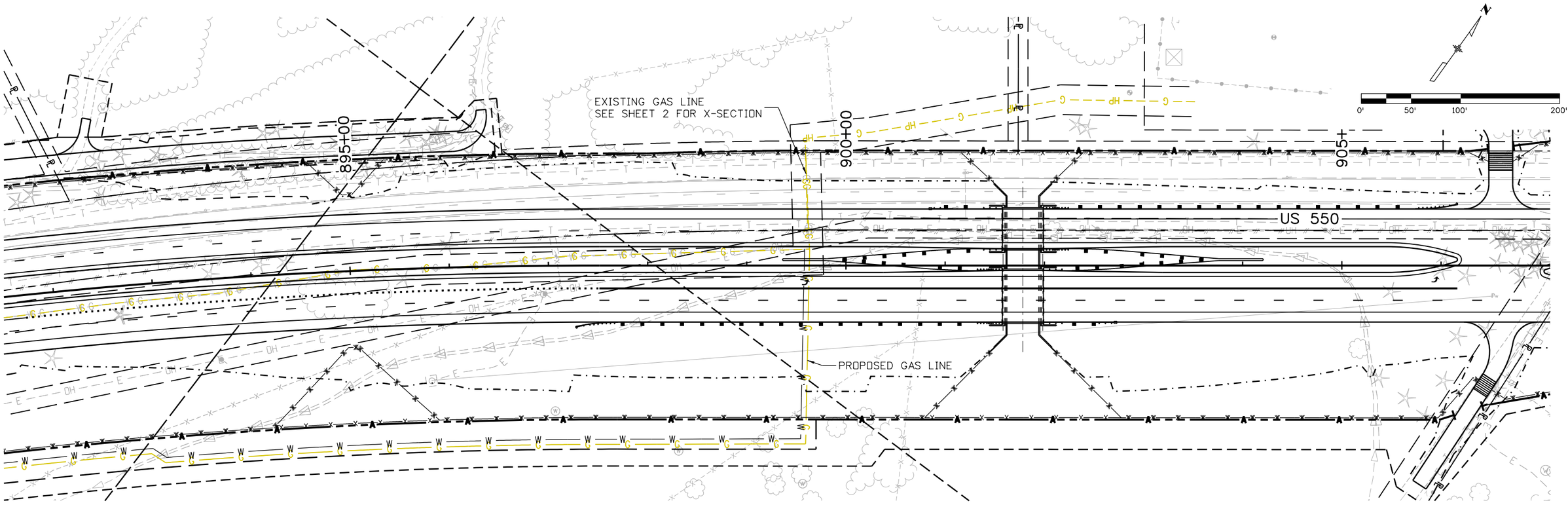

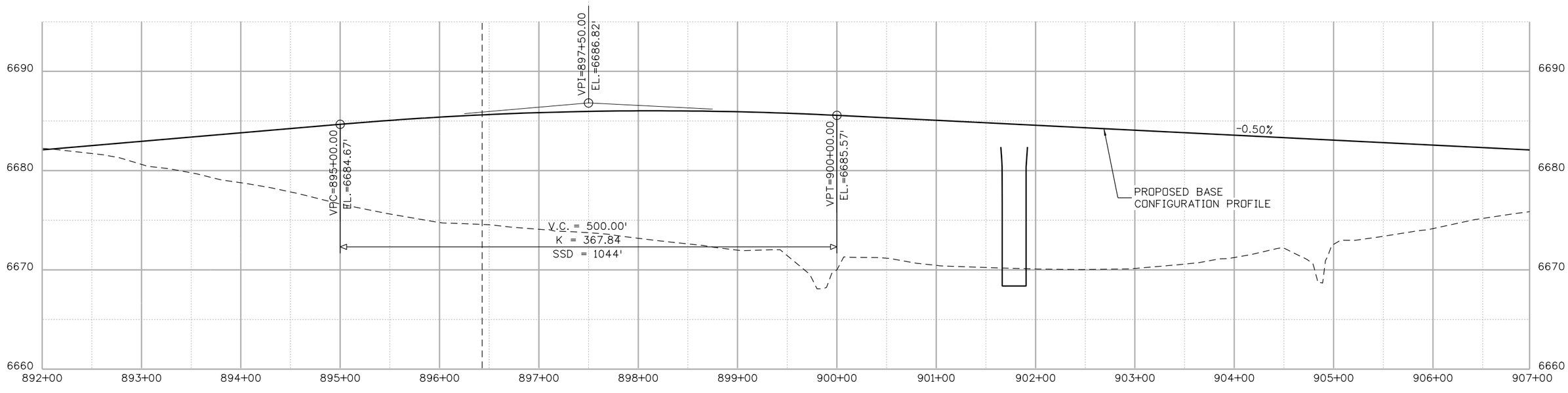

US 550
GAS LINE CROSSINGS
899+50

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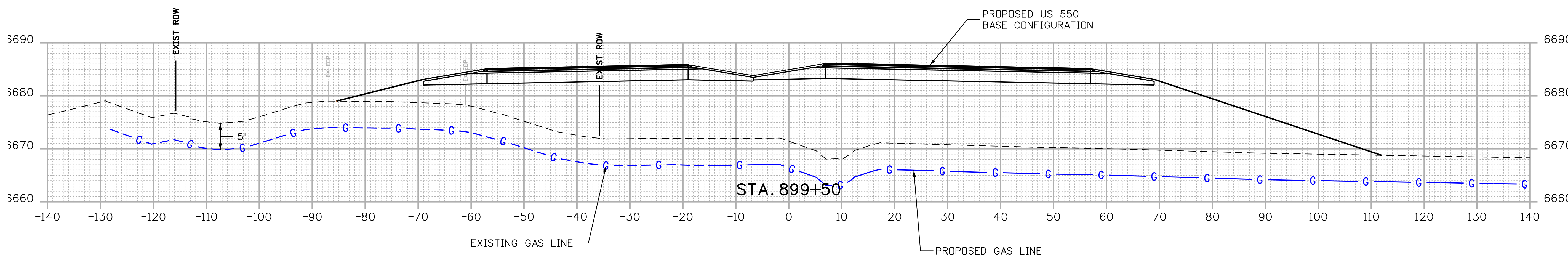

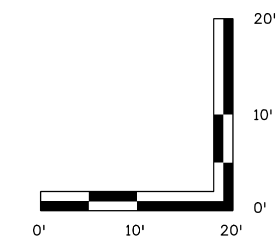

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US 550
GAS LINE CROSSINGS
899+50 (2)

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