# I-29 SALIX INTERCHANGE

## Woodbury County Design # 715

## BRFIMX-29-6(246)134- -14-97

SHUCK-BRITSON INC
CONSULTING ENGINEERS

IOWA DOT
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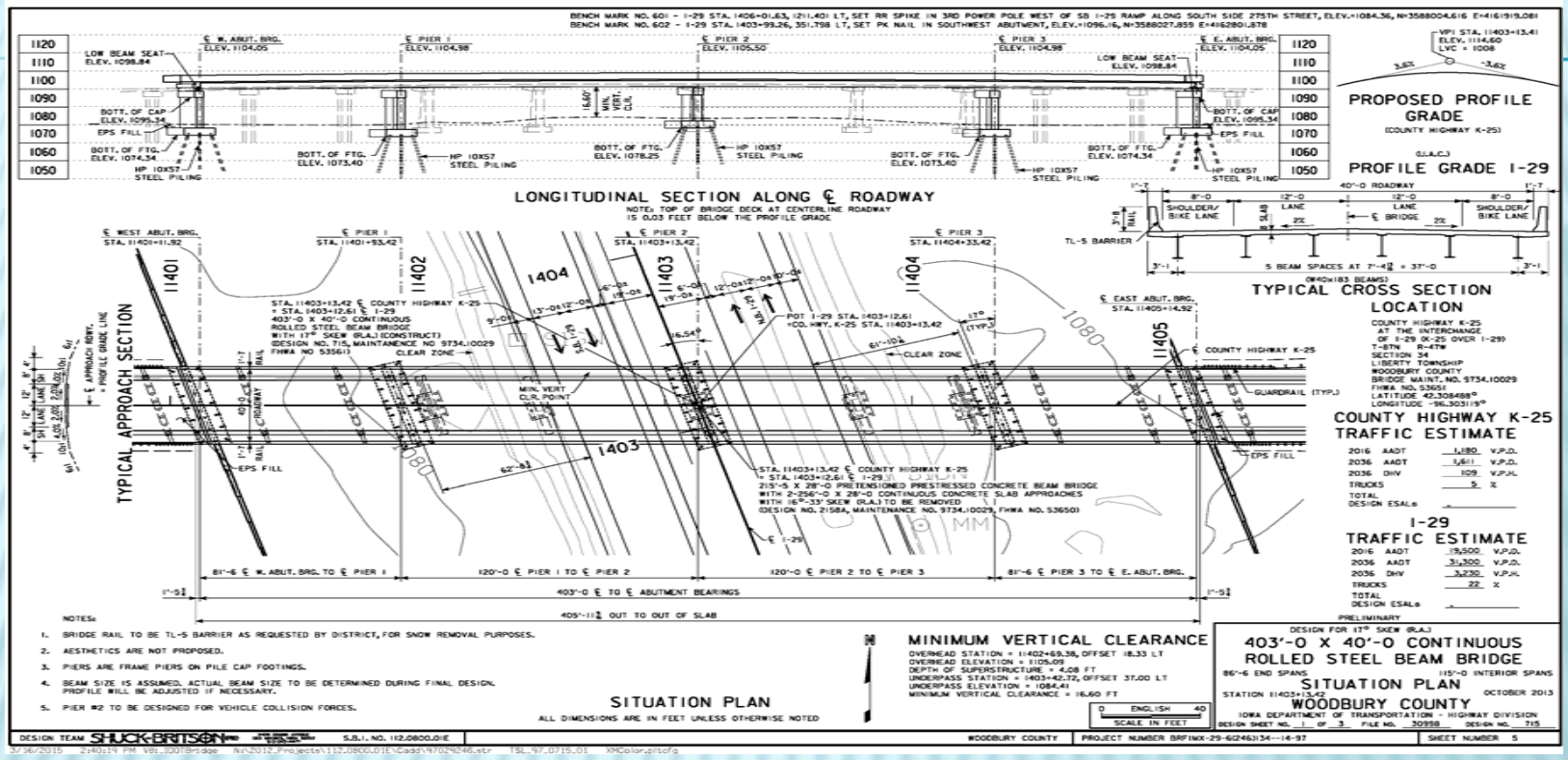
# PROJECT BACKGROUND




- Poor soils
- Structure length/ approach embankment length
- Steel superstructure to control weight
- Initially rolled beams, changed to CWPG per DOT request

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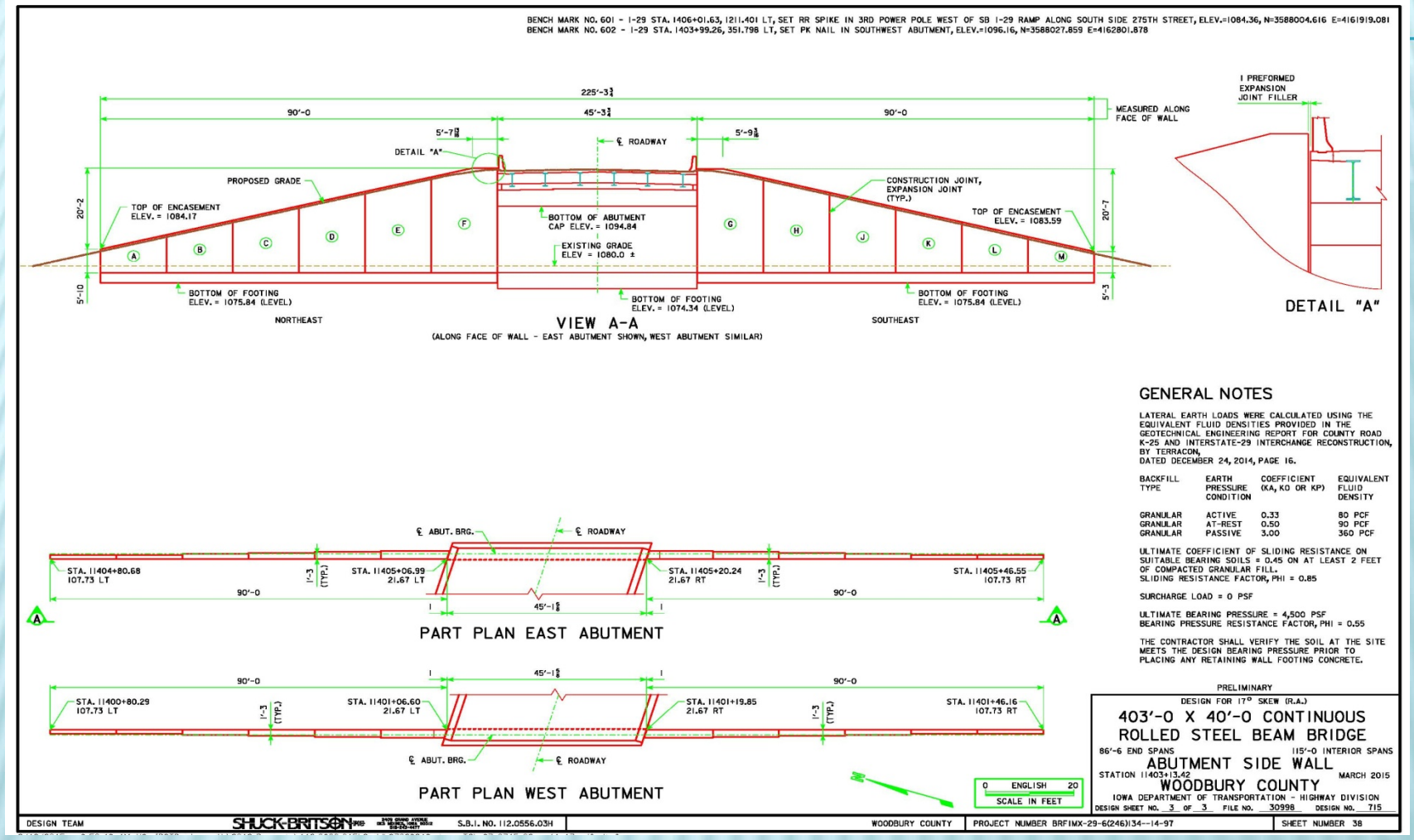


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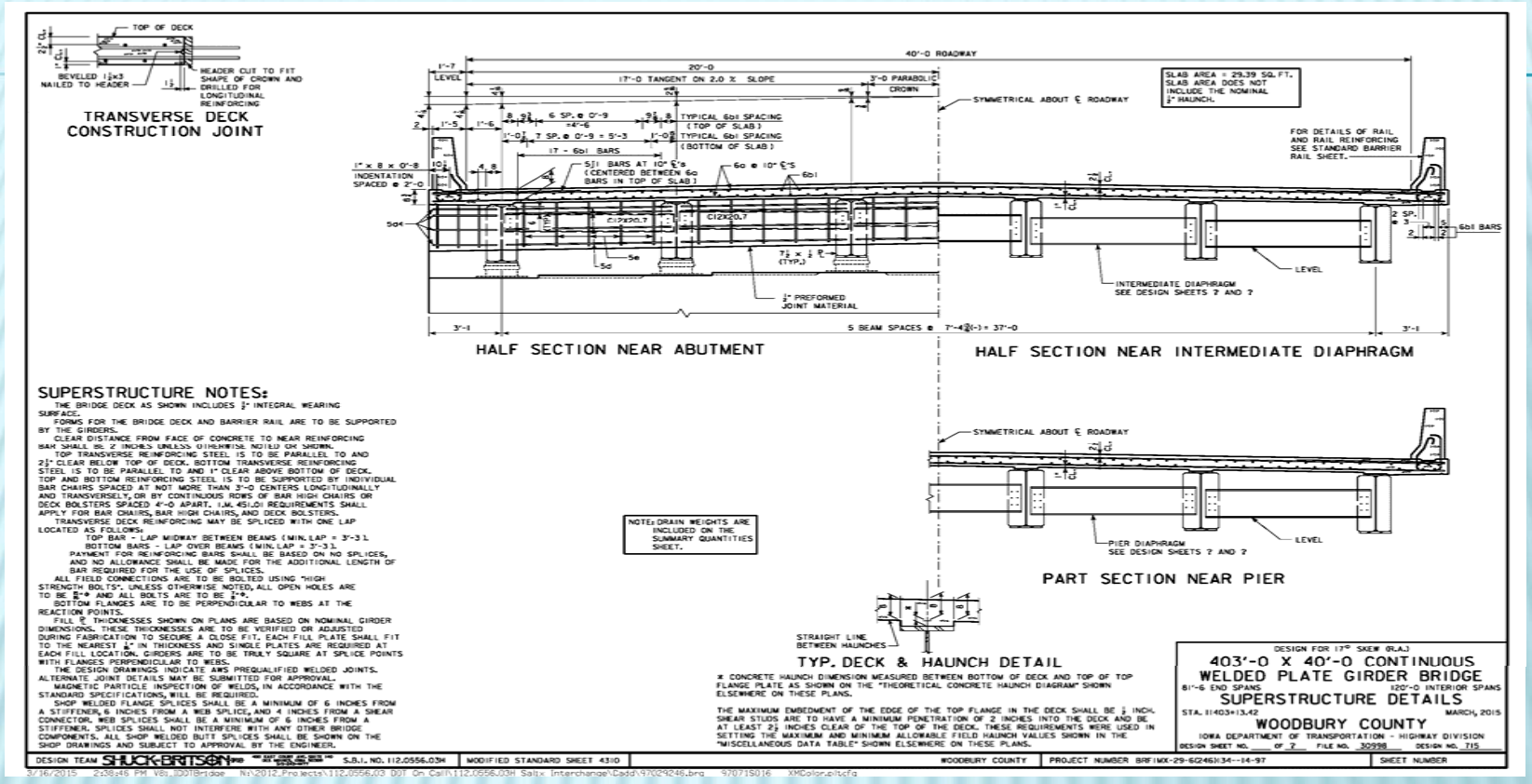
# INITIAL GIRDER DESIGN / ANALYSIS




- Maintain same girder depth
- Assume unstiffened web
- Minimize required plate thicknesses
- Analysis based on strength / fatigue values for A709 Grade 50
- Maximize yield from standard plate widths / lengths

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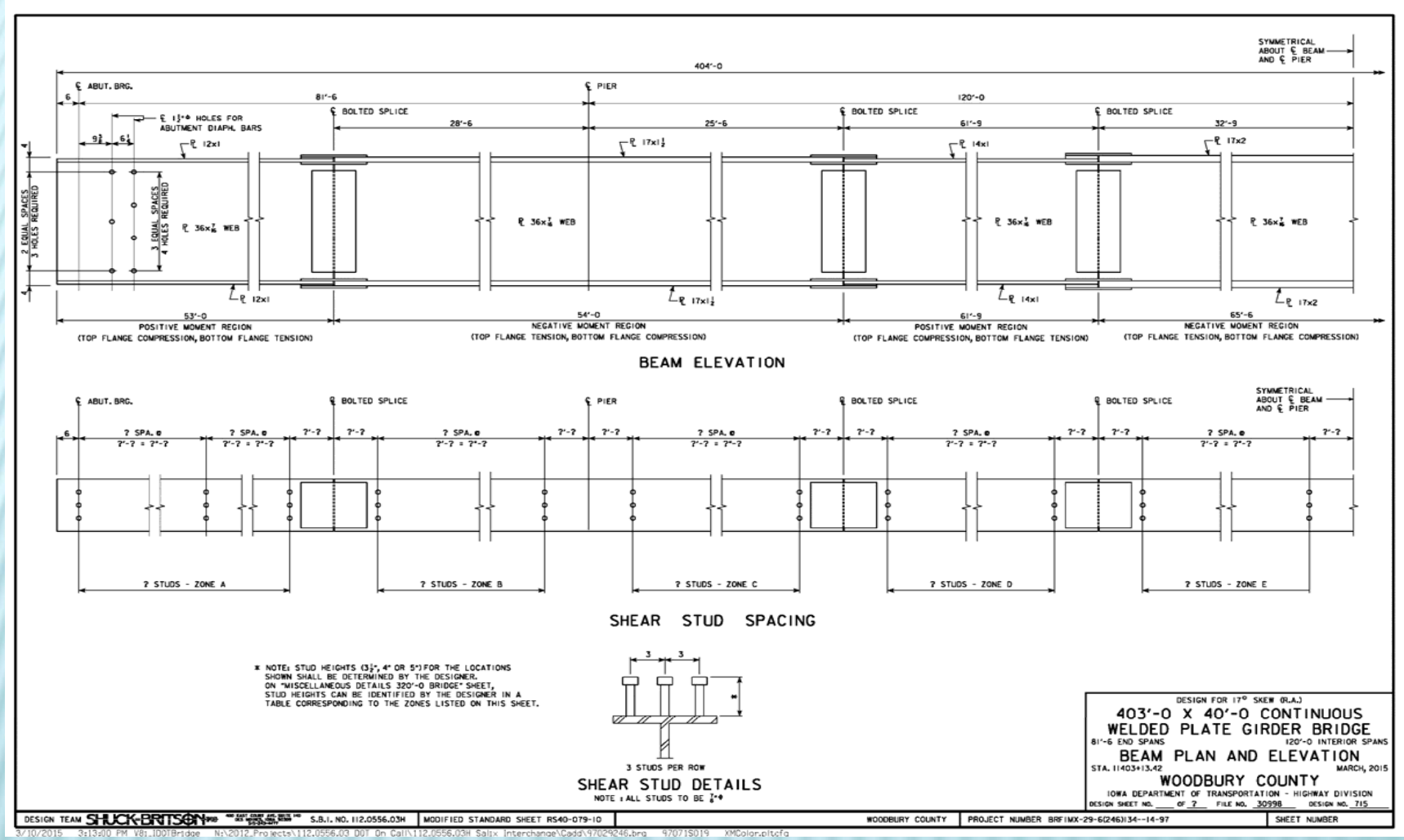


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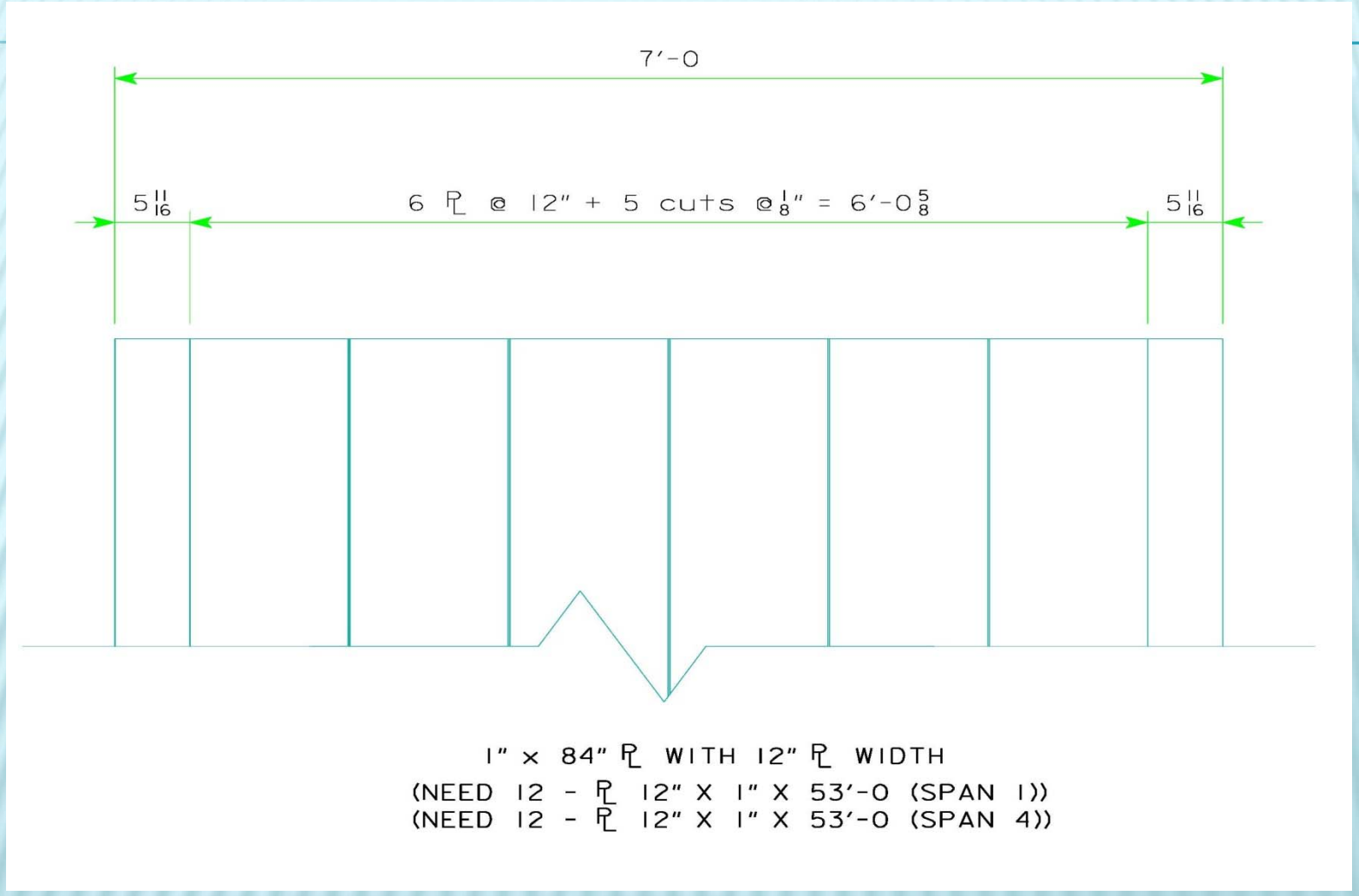


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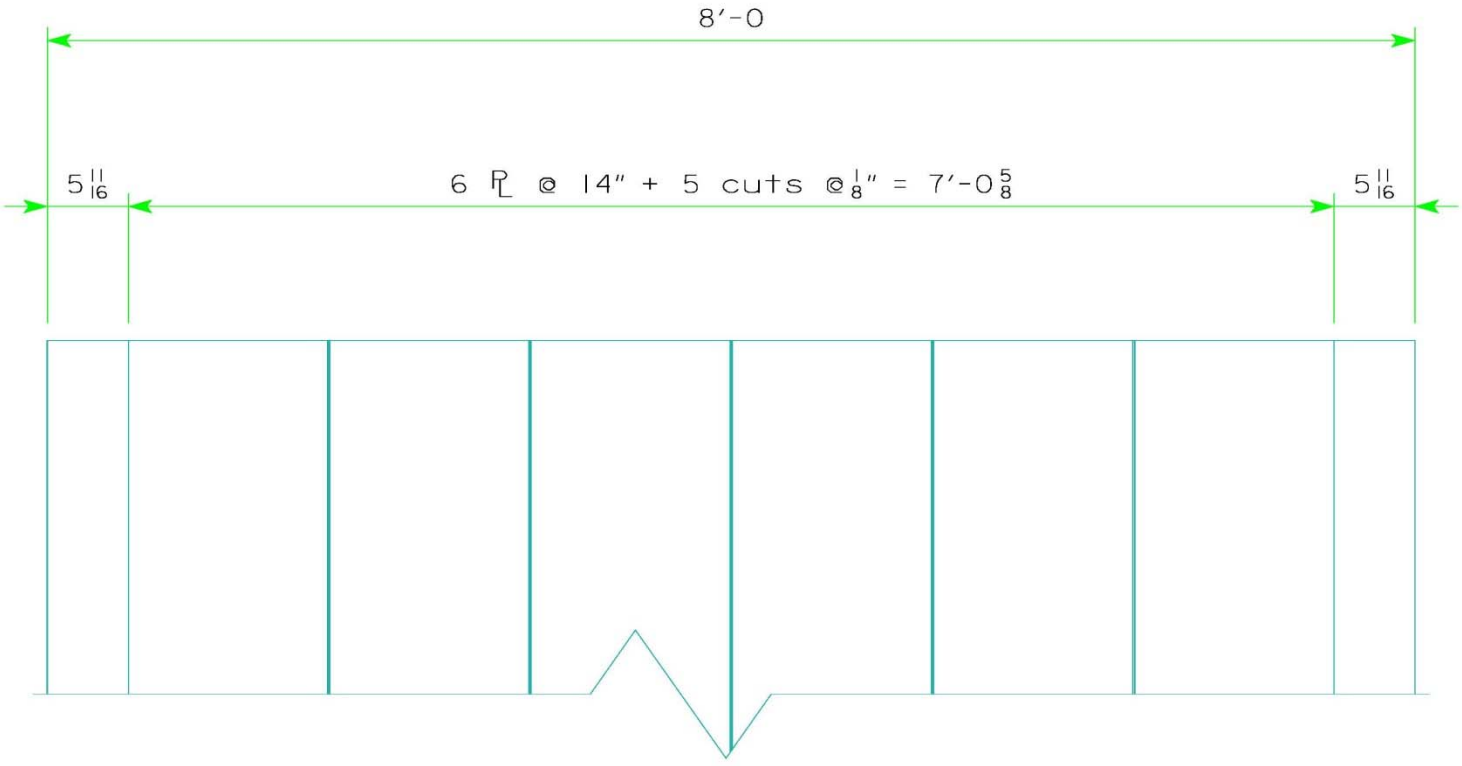


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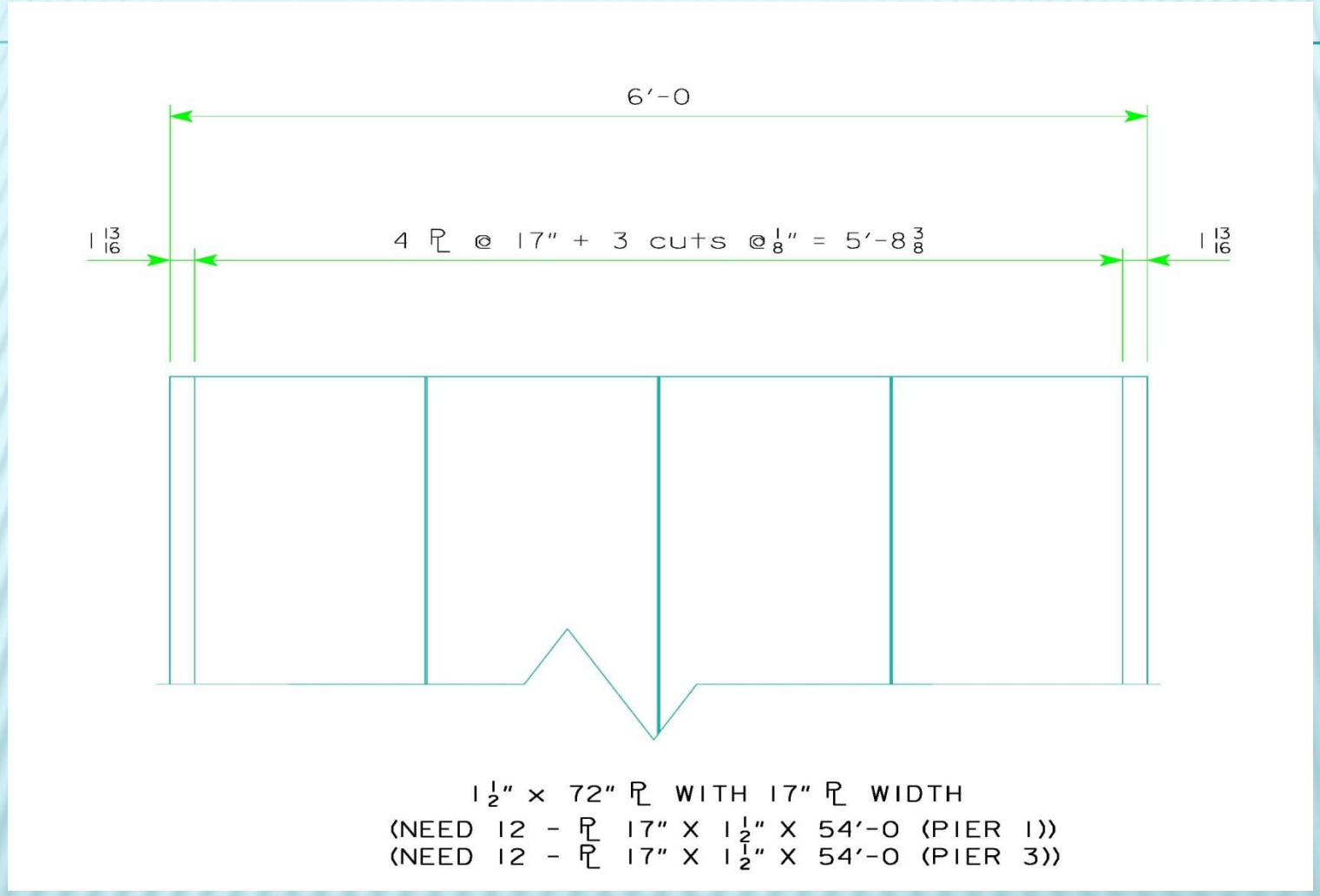


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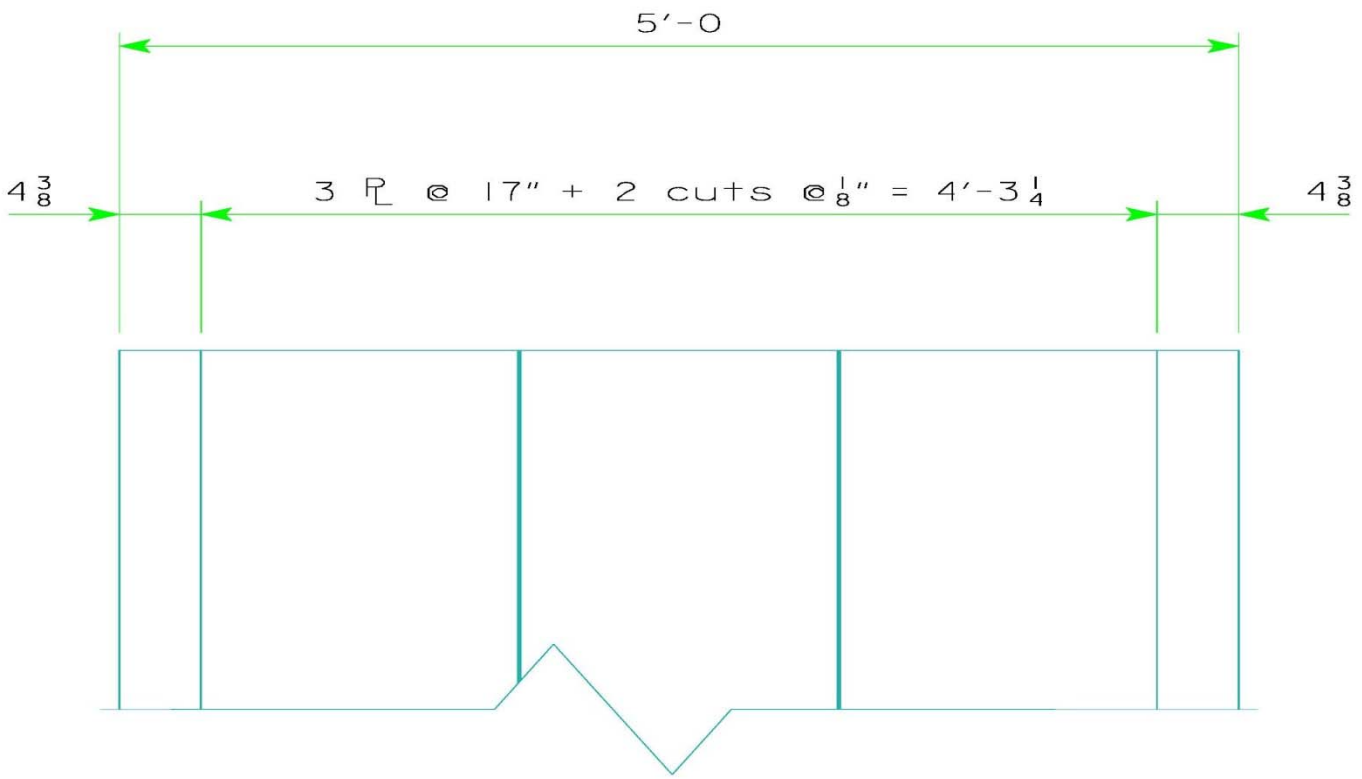


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# INITIAL GIRDER DESIGN / ANALYSIS

**PRELIMINARY GIRDER DESIGN / ANALYSIS**

| | | SPAN 1 | PIER 1 | SPAN 2 | PIER 2 |
|---|---|---|---|---|---|
| FLANGE PLATE | top | 12 X 1 | 17 X 1 1/2 | 14 X 1 | 17 X 2 |
| | bott | 12 X 1 | 17 X 1 1/2 | 14 X 1 | 17 X 2 |
| CONSTRUCTIBILITY PERFORMANCE RATIO | top | 0.81 | NA | 0.87 | NA |
| | bott | 0.67 | NA | 0.72 | NA |
| STRENGTH PERFORMANCE RATIO | | 0.72 | 0.99 | 0.89 | 0.99 |
| SERVICE PERFORMANCE RATIO | top | 0.21 | 0.94 | 0.29 | 0.94 |
| | bott | 0.75 | 0.94 | 0.91 | 0.94 |
| FATIGUE II RATIO (at diaphragm stiffener) | top | 0.04 | 0.39 | 0.06 | 0.30 |
| | bott | 0.51 | 0.39 | 0.55 | 0.30 |

# DISCUSSION ITEMS FOR DESIGN COMPLETION

- Strength design values
  - Confirm same allowable values as A709 Grade 50

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# DISCUSSION ITEMS FOR DESIGN COMPLETION

- Fatigue design values
  - Confirm same allowable values as A709 Grade 50
  - Welded connections
    - Web/flange connection – Category B – 16 ksi
    - Bolted connections (splices) – Category B – 16 ksi
    - Diaphragm stiffener locations – Category C' – 12 ksi
    - Shear studs – Category C – 10 ksi

# DISCUSSION ITEMS FOR DESIGN COMPLETION

- Bolted splice connections
  - Galvanic corrosion between A325 bolts/A1010 Grade 50 plate
  - Slip critical connections (slip coefficient values?)
    - Not currently covered by AASHTO/AISC Specifications

# DISCUSSION ITEMS FOR DESIGN COMPLETION

- Headed studs/welded connection for composite action
  - Strength value
  - Fatigue value
  - Per Nelson Stud Welding, testing should be conducted with A1010 plates:
    - Mild steel studs
    - Stainless steel studs

# DISCUSSION ITEMS FOR DESIGN COMPLETION

- Material for diaphragm stiffener connection plates
- Material for sole plates welded to bottom flanges
- Diaphragm material and bolts (match standards?)

# DISCUSSION ITEMS FOR DESIGN COMPLETION

- Developmental specifications?
  - Material handling requirements
  - Welding procedures/specifications?
  - Material or weld testing requirements

# QUESTIONS?

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