

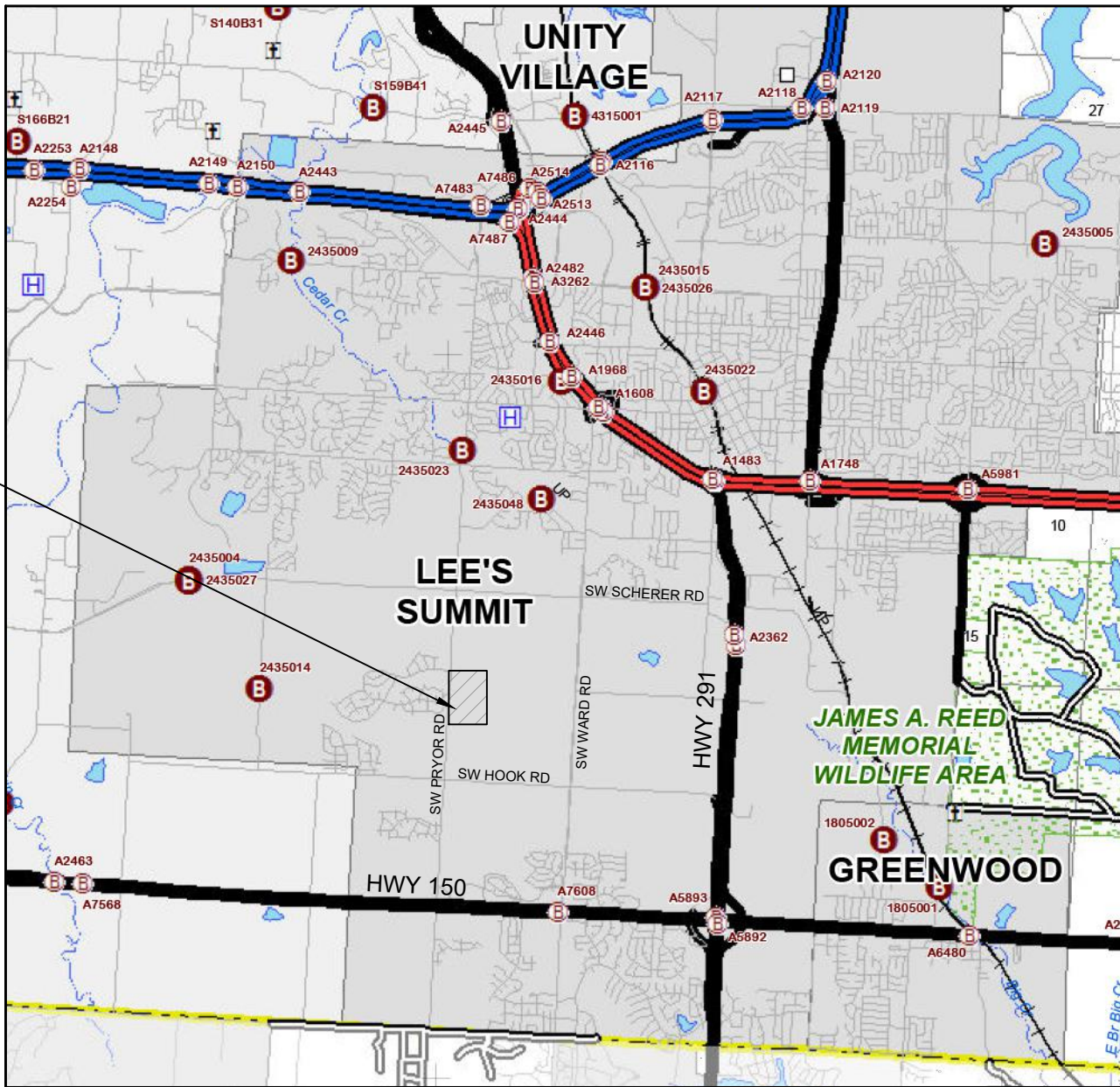
CONSTRUCTION PLANS  
FOR  
WHISPERING WOODS 3RD PLAT CREEK RESTORATION  
CITY OF LEE'S SUMMIT  
JACKSON COUNTY, MISSOURI

PROJECT BENCH MARK

ELEV. 1006.89 (NAVD 1988 DATUM)

MISSOURI DEPARTMENT OF NATURAL RESOURCES GRS  
ALUMINUM DISK STAMPED "JA-47" LOCATED NEAR THE  
INTERSECTION OF HWY 150 WITH REGGATA DRIVE AND HWY 291

PROJECT LOCATION



LOCATION MAP  
N.T.S.

Sheet List Table

| Sheet Number | Sheet Title                  |
|--------------|------------------------------|
| C1.0         | TITLE SHEET                  |
| C2.0         | EXISTING CONDITIONS          |
| C2.1         | OVERALL GRADING              |
| C2.2         | CHANNEL PLAN & PROFILE       |
| C3.0         | CHANNEL CROSS SECTIONS       |
| C3.1         | CHANNEL CROSS SECTIONS       |
| C3.2         | CHANNEL CROSS SECTIONS       |
| C3.3         | CHANNEL CROSS SECTIONS       |
| C4.0         | LANDSCAPE - TREES            |
| C4.1         | LANDSCAPE - GRASS            |
| C5.0         | BOX CULVERT PLAN AND PROFILE |
| C5.1         | BOX CULVERT DETAILS          |
| C5.2         | BOX CULVERT DETAILS          |
| C5.3         | BOX CULVERT DETAILS          |
| C5.4         | BOX CULVERT DETAILS          |
| C5.5         | BOX CULVERT DETAILS          |
| C5.6         | BOX CULVERT DETAILS          |
| C5.7         | BOX CULVERT DETAILS          |

APPROVED:

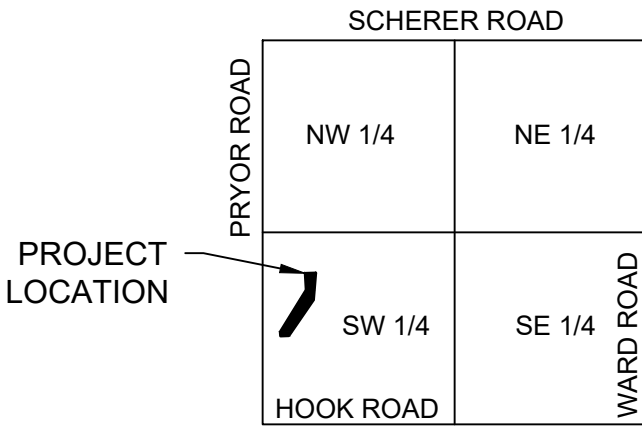
City Engineer

Date

DEVELOPER:

WHISPERING WOODS LAND, L.L.C.  
803 P.C.A. ROAD  
WARRENSBURG, MO 64093  
AGENT: RICK FRYE  
PHONE: 816.564.2230  
FAX: 660.429.1801

| UTILITY SERVICE NUMBERS     |              |
|-----------------------------|--------------|
| SPECTRUM                    | 886-874-2389 |
| EVERGY                      | 816-220-5213 |
| SPIRE GAS                   | 816-399-9633 |
| LEE'S SUMMIT PUBLIC WORKS   | 816-969-1800 |
| CITY PLANNING & DEVELOPMENT | 816-969-1600 |
| FIRE DEPARTMENT             | 816-969-1300 |



VICINITY MAP  
N.T.S.

| MARK                                                                                                 | REVISION         | DATE              | BY |
|------------------------------------------------------------------------------------------------------|------------------|-------------------|----|
| Engineer: SD                                                                                         | Checked By: SD   | Scale: 1" =       |    |
| Technician: BT                                                                                       | Date: 04-15-2022 | T-R-S: 47N-32W-24 |    |
| Snyder & Associates Engineers & Planners, Inc.<br>Missouri State Certificate of Authority #200608544 |                  |                   |    |
| Sheet C1.0                                                                                           |                  |                   |    |



SHAWN DUKE - ENGINEER  
MO PE#2013006489

WHISPERING WOODS CREEK RESTORATION

LEE'S SUMMIT, MO

TITLE SHEET

**SNYDER & ASSOCIATES**  
ENGINEERS & PLANNERS, INC.

802 FRANCIS STREET  
ST. JOSEPH, MISSOURI 64501  
816-364-5222 | www.snyder-associates.com



Project No: 120.0485.11

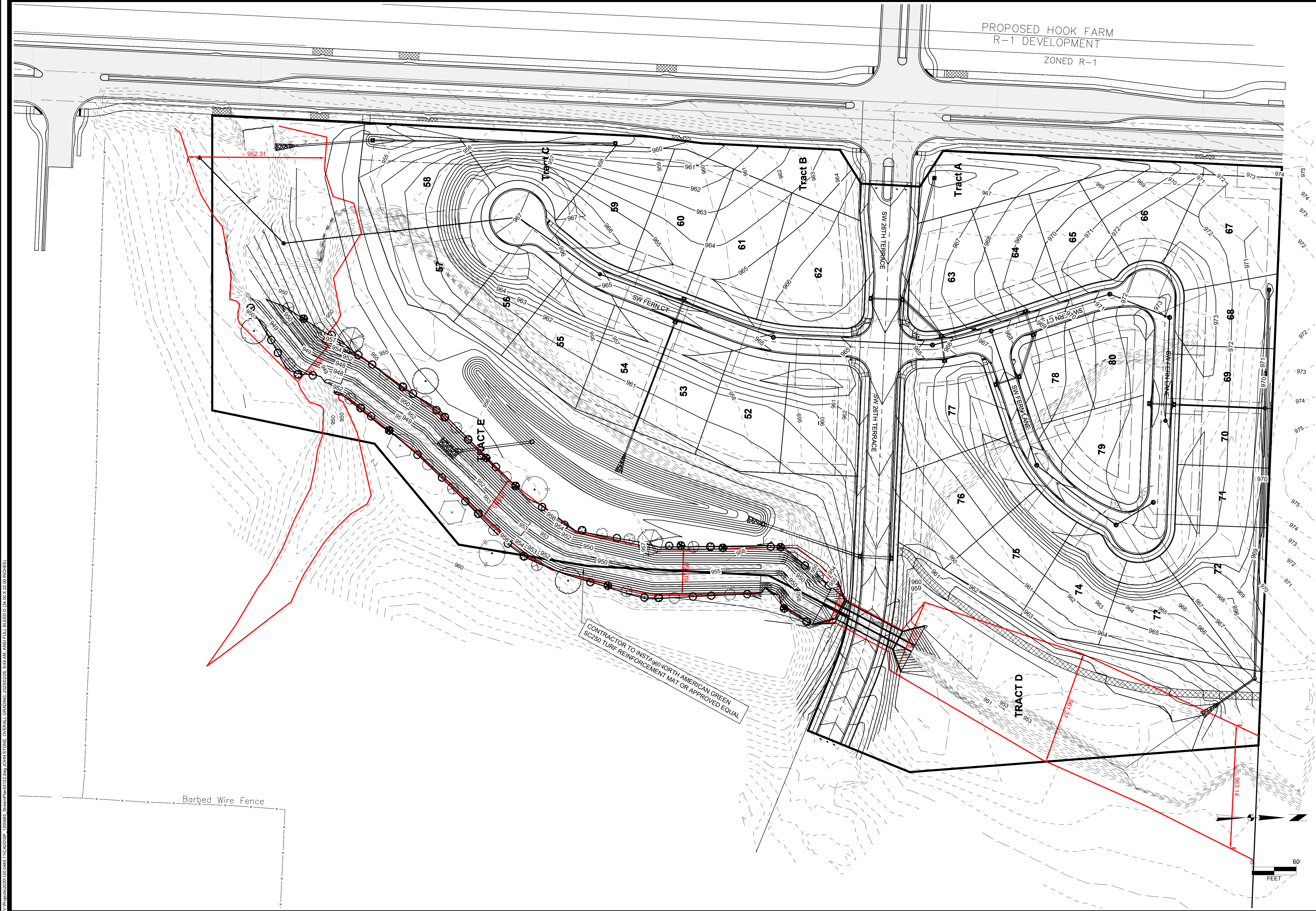
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| Technician: BT | Date: 04-15-2022 |          | T-R-S: 47N-32W-24 |    |

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Missouri State Certificate of Authority #2060608544

Sheet C2.1

STATE OF MISSOURI  
SHAWN DUKE  
PROFESSIONAL ENGINEER  
NUMBER: MO-PE-2013006489

SHAWN DUKE - ENGINEER  
MO PE#2013006489

WHISPERING WOODS CREEK RESTORATION

OVERALL GRADING

LEE'S SUMMIT, MO

**SNYDER & ASSOCIATES**  
ENGINEERS & PLANNERS, INC.

802 FRANCIS STREET  
ST. JOSEPH, MISSOURI 64501  
816-364-5222 | www.snyder-associates.com

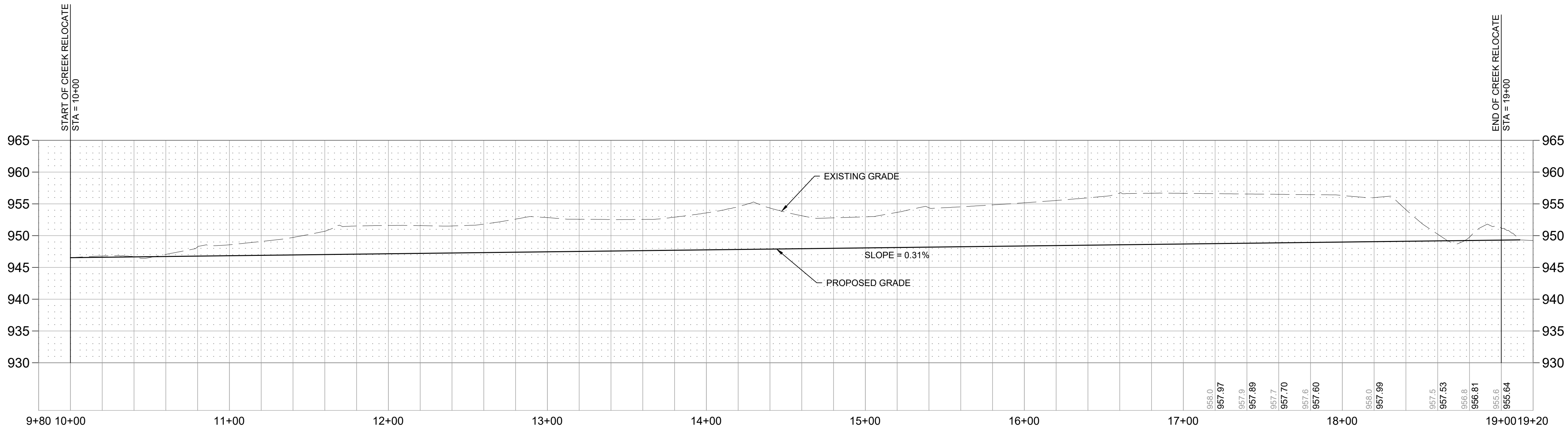
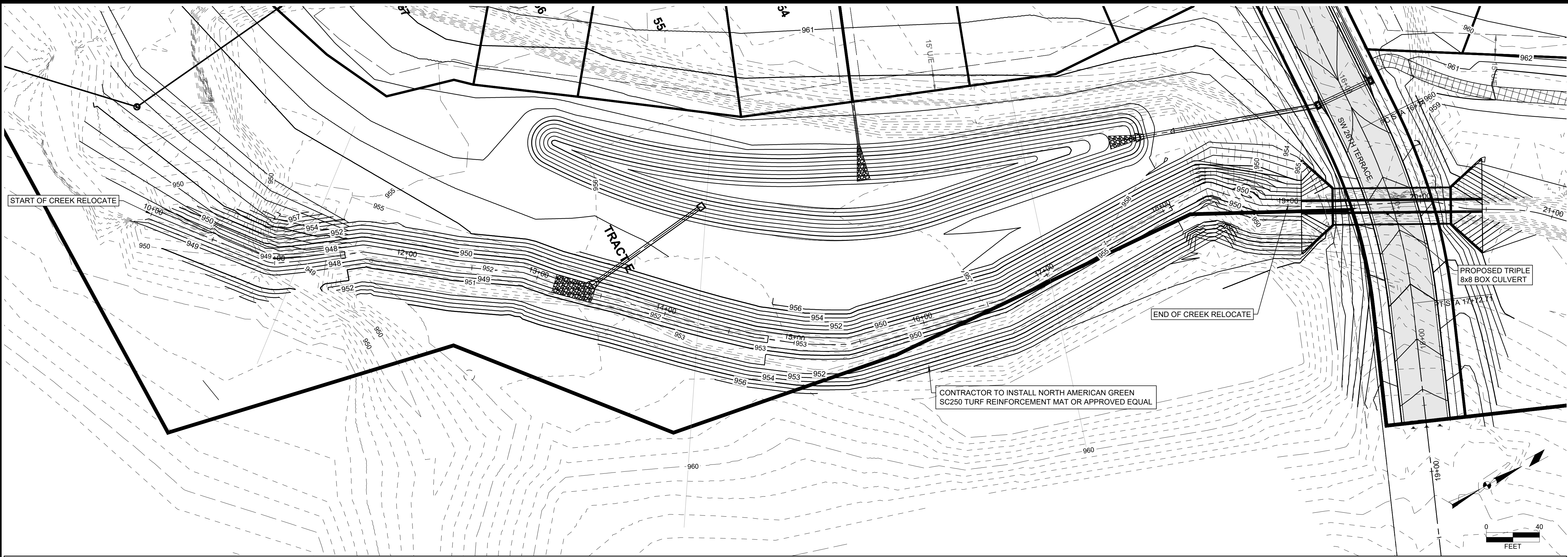
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Sheet C2.1

**SNYDER & ASSOCIATES**



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Missouri State Certificate of Authority #200608544

SHAWN DUKE - ENGINEER  
MO PE#2013006489

STATE OF MISSOURI  
SHAWN DUKE  
NUMBER  
PE-2013006489  
PROFESSIONAL ENGINEER

WHISPERING WOODS CREEK RESTORATION

CHANNEL PLAN & PROFILE

LEE'S SUMMIT, MO

**SNYDER & ASSOCIATES**  
ENGINEERS & PLANNERS, INC.

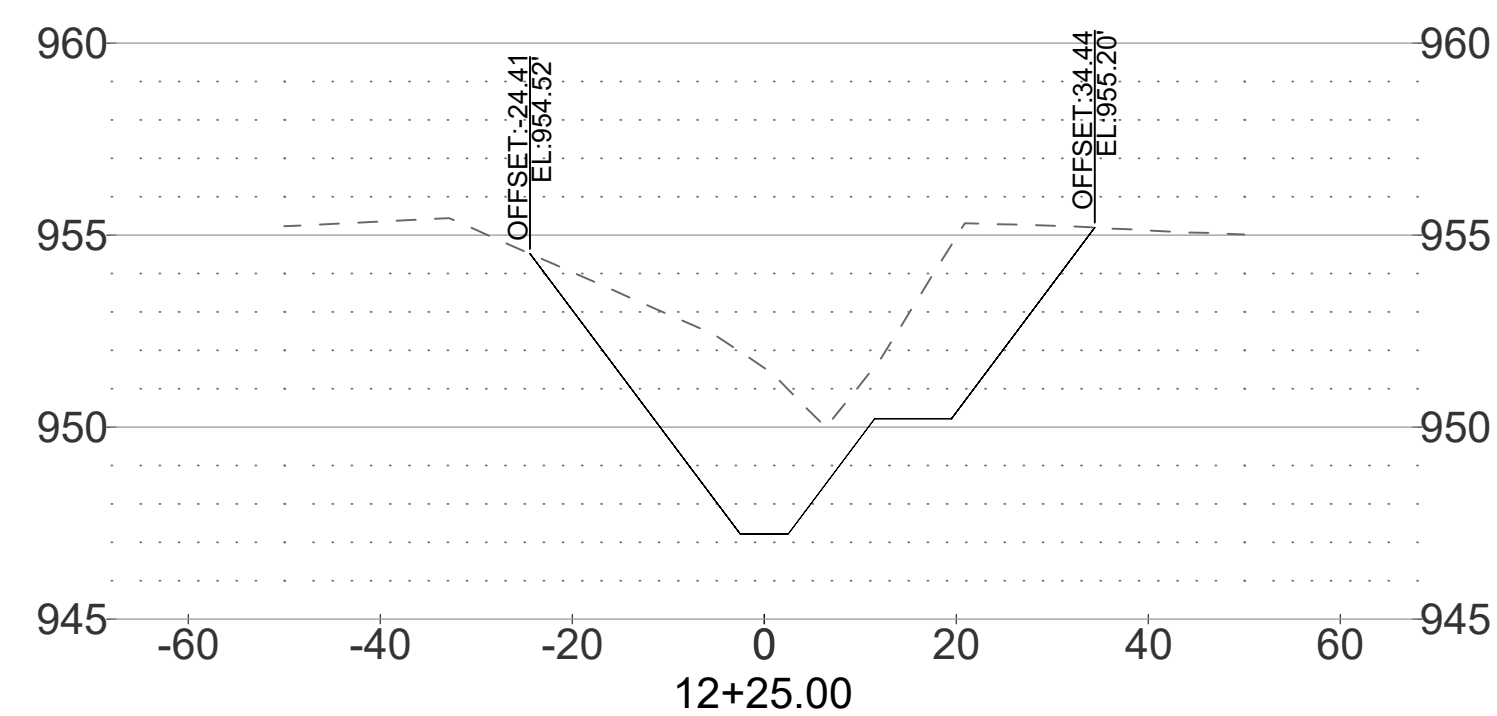
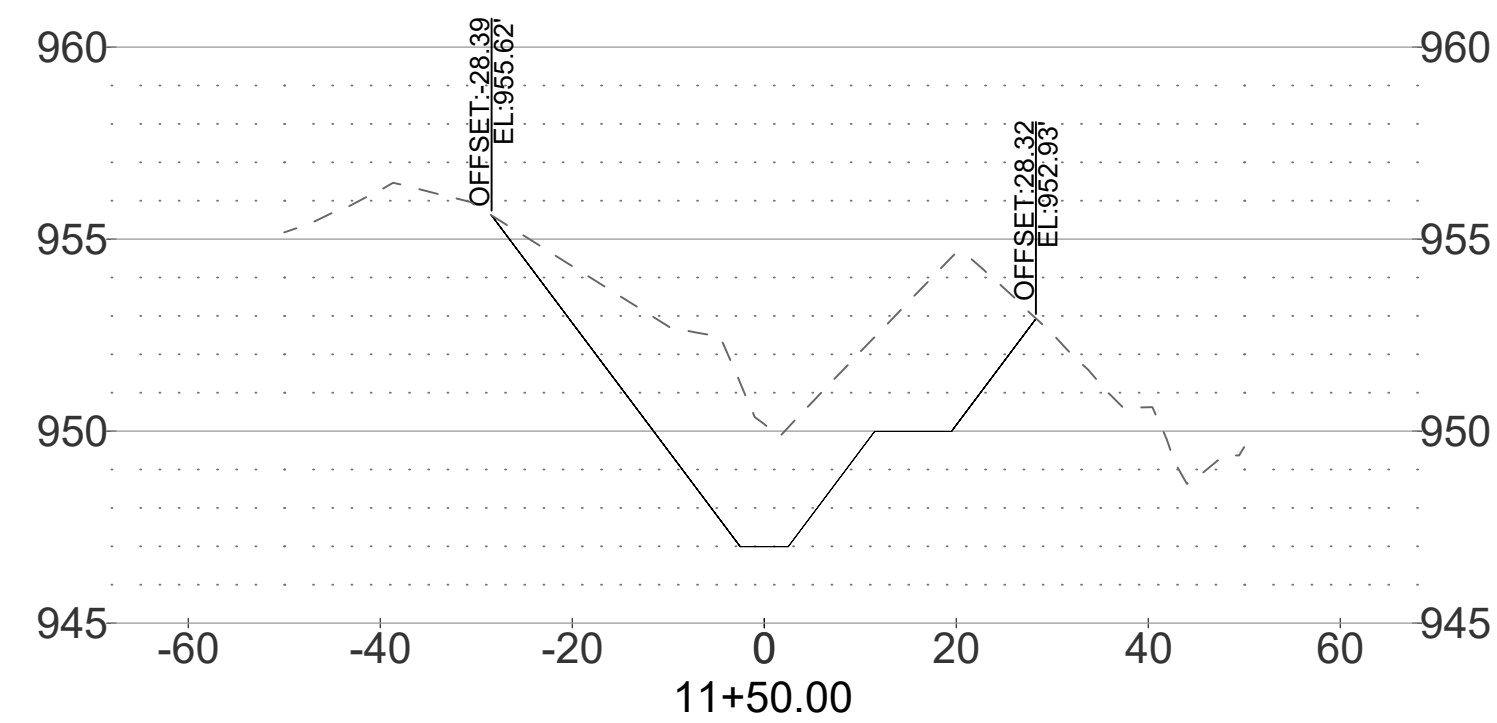
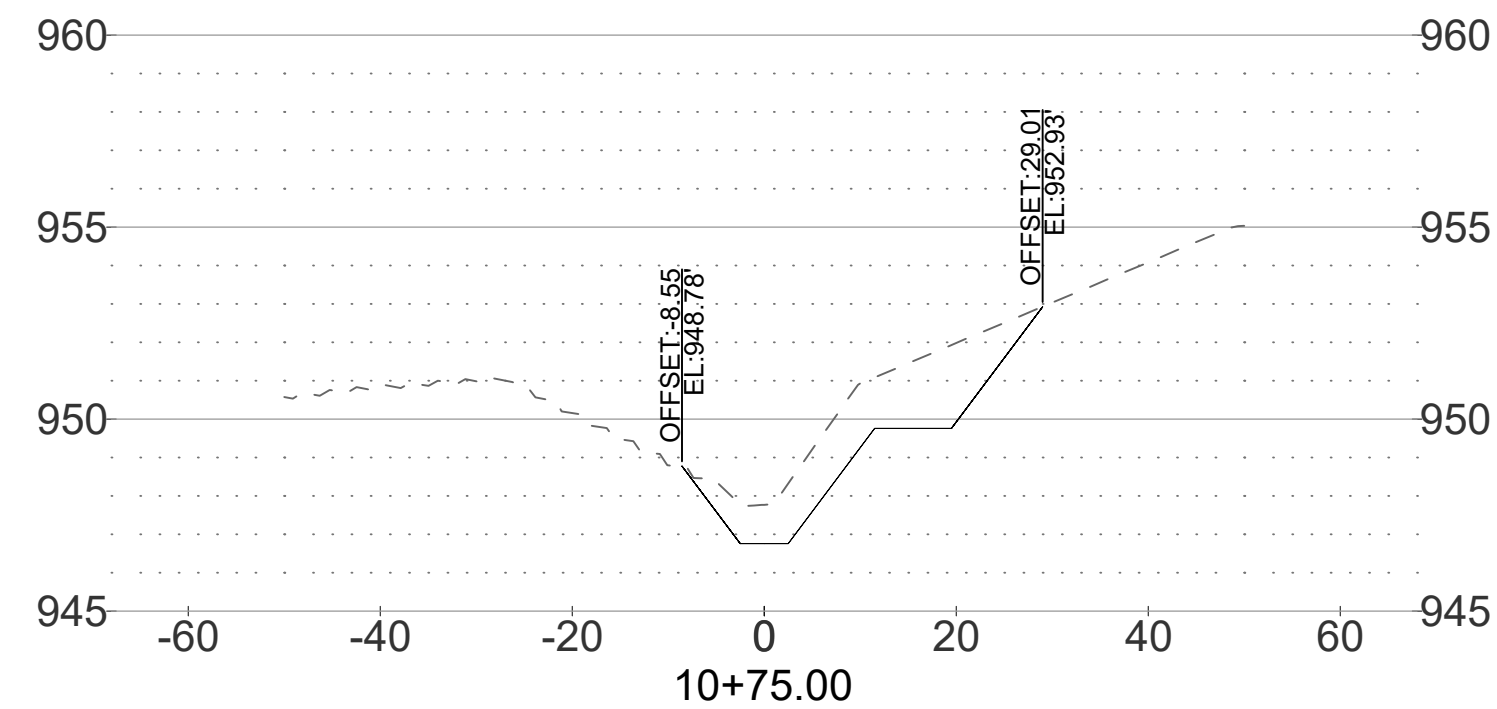
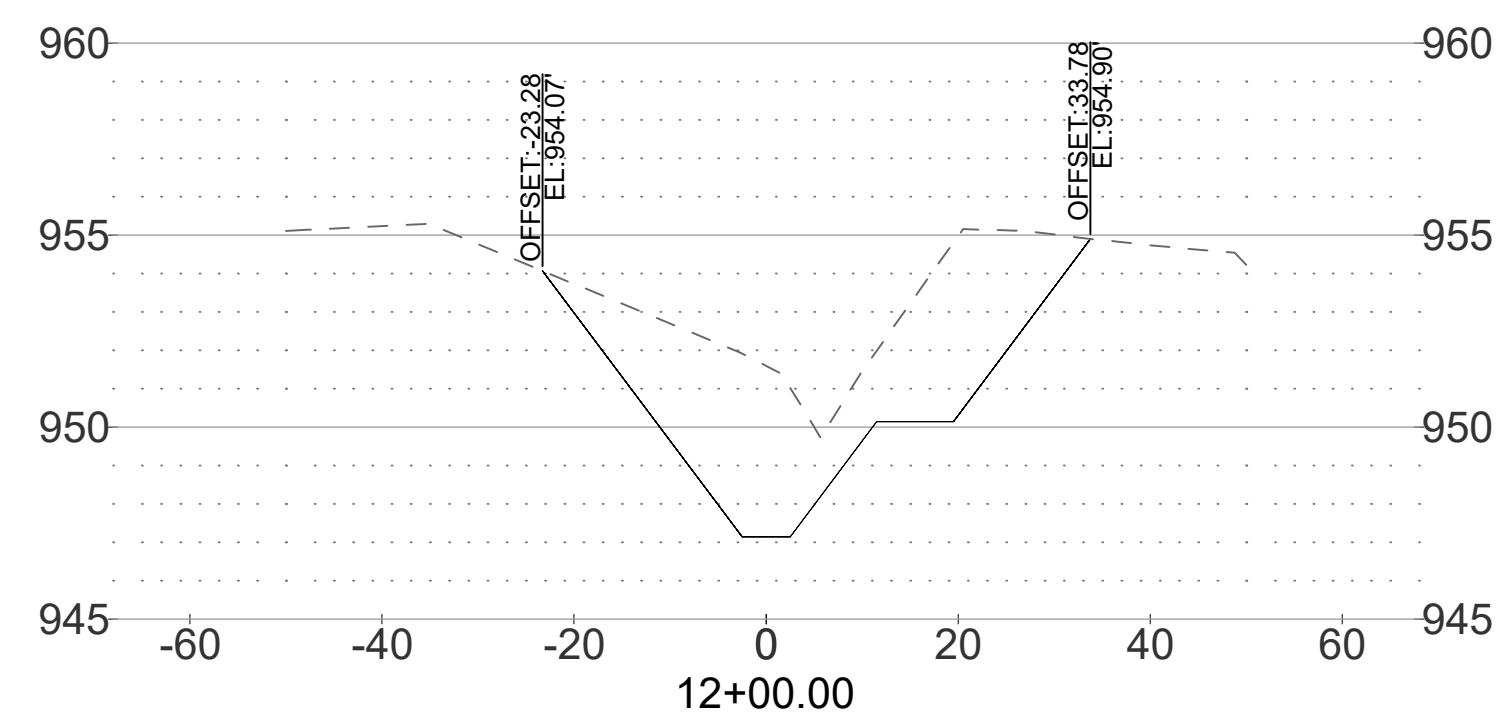
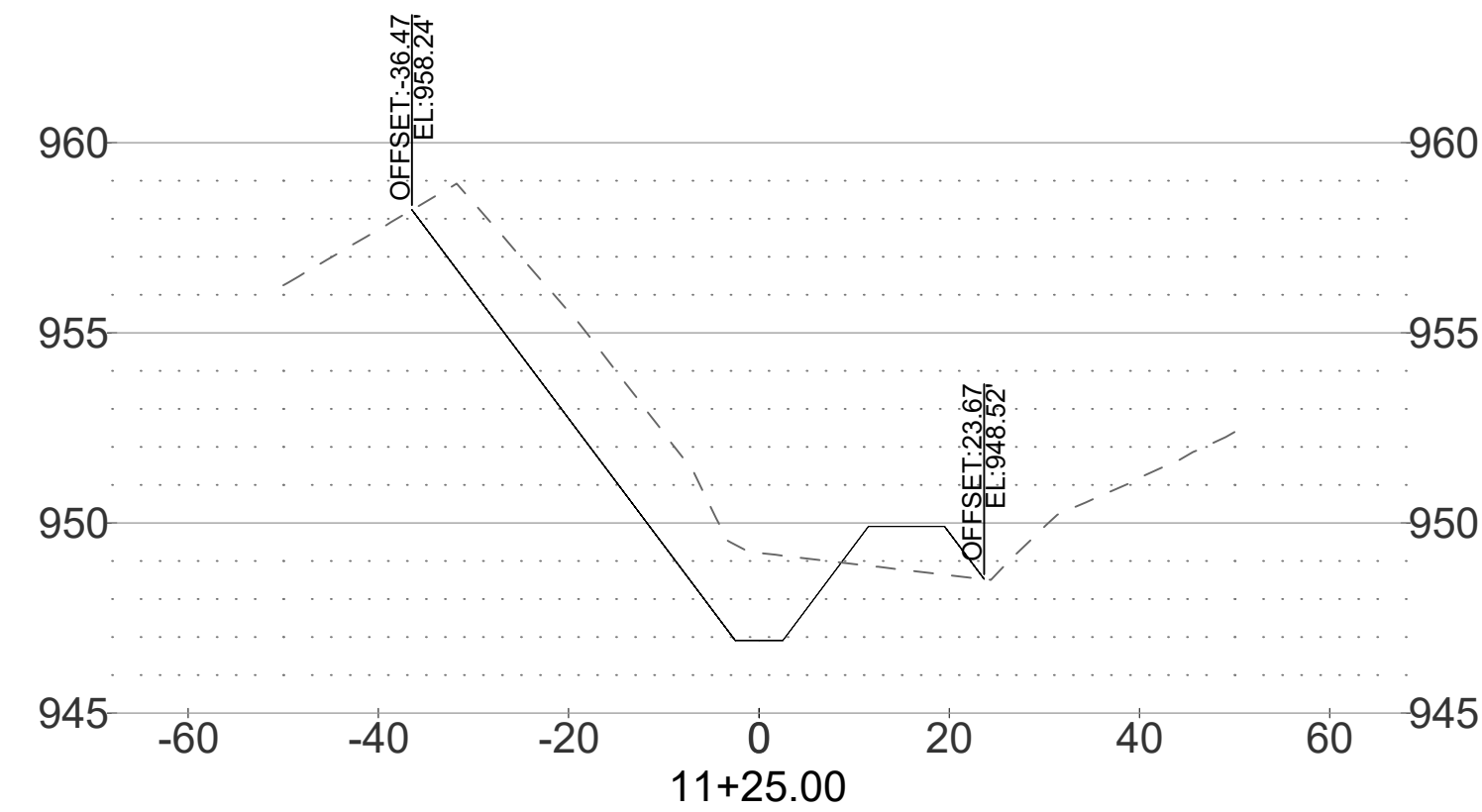
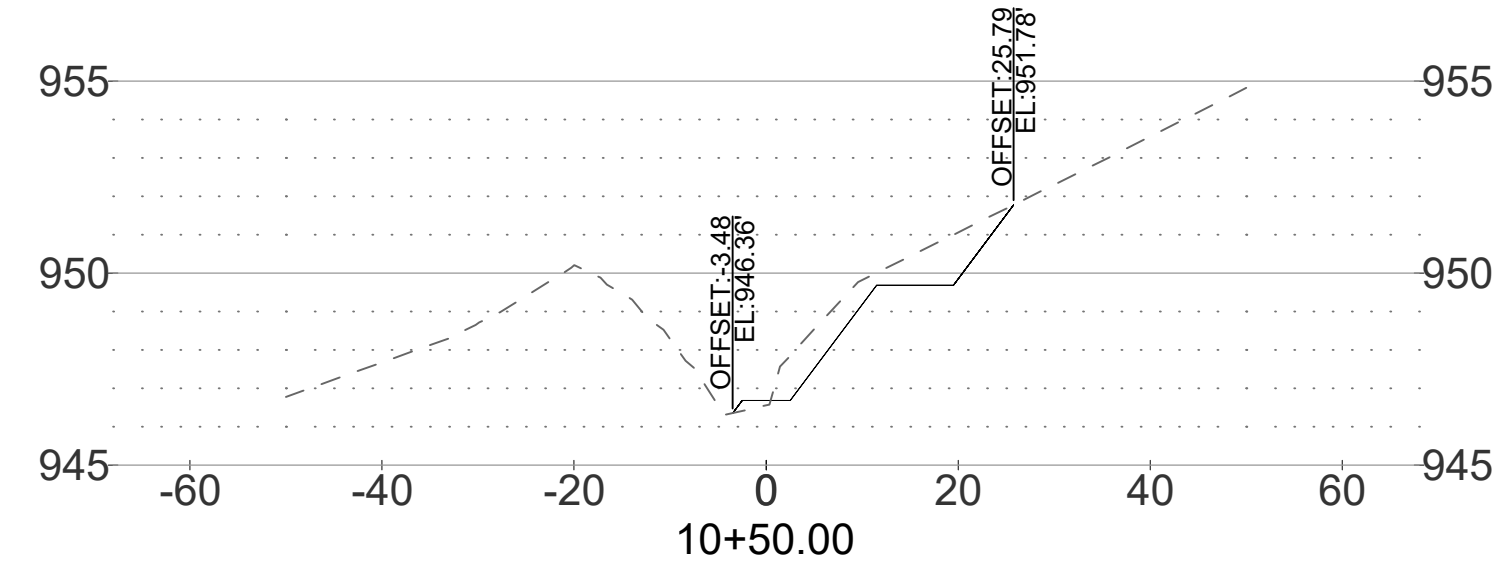
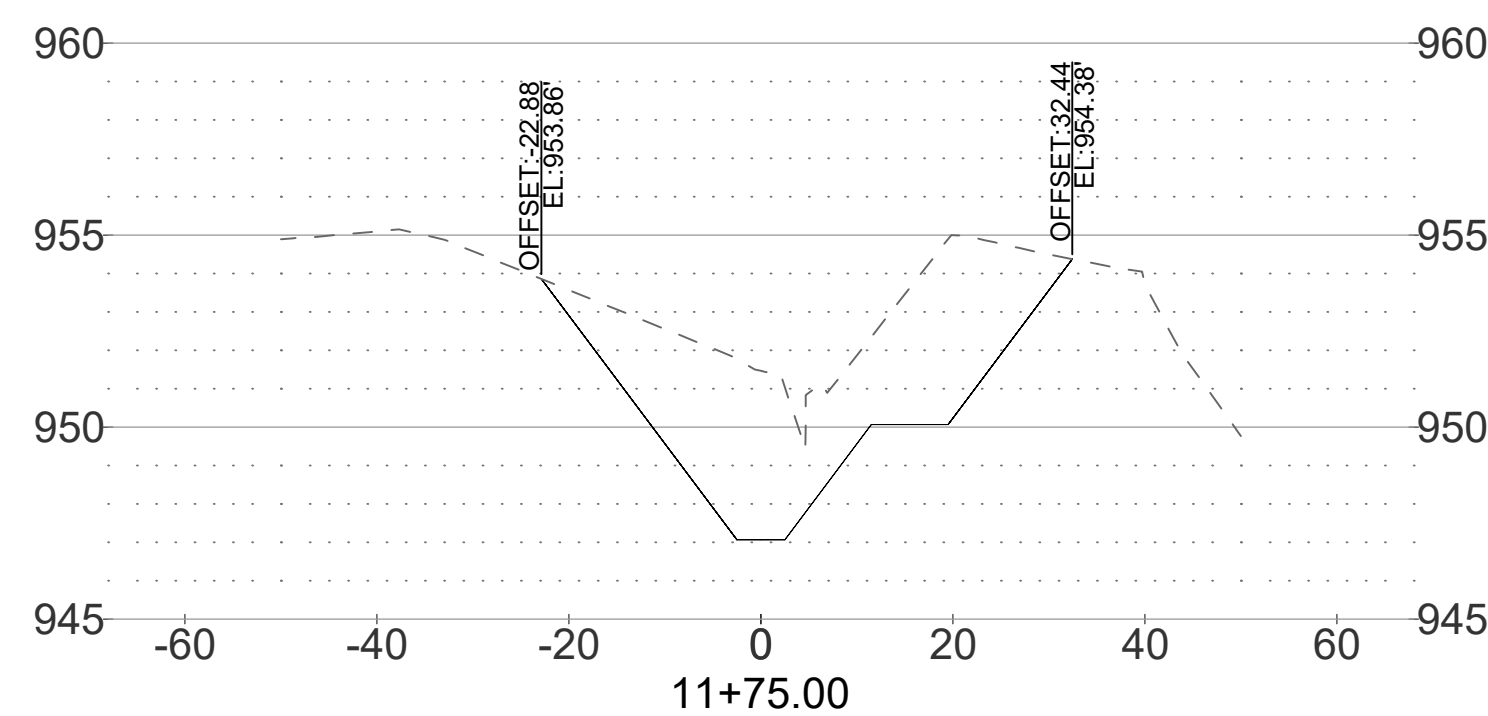
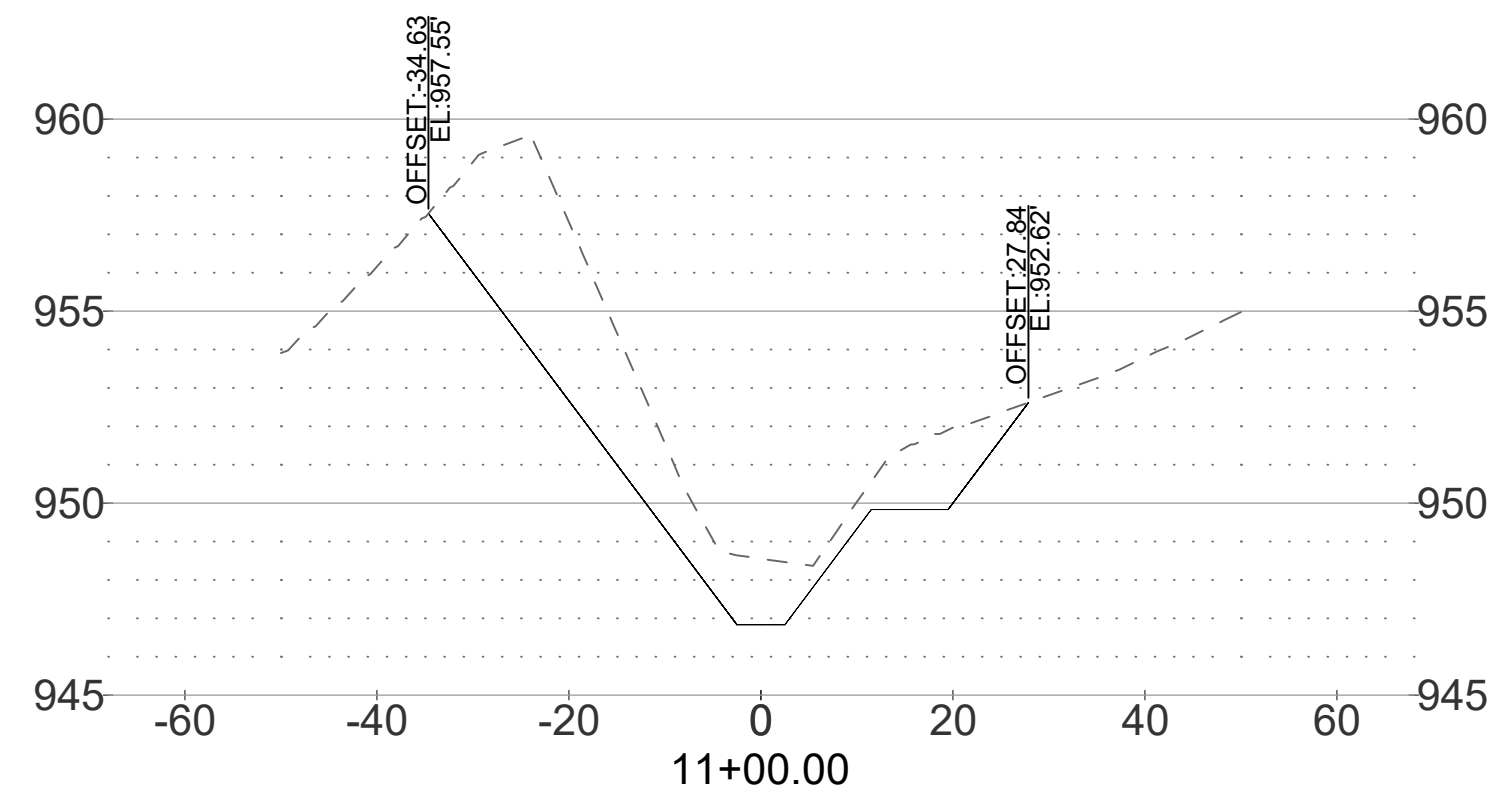
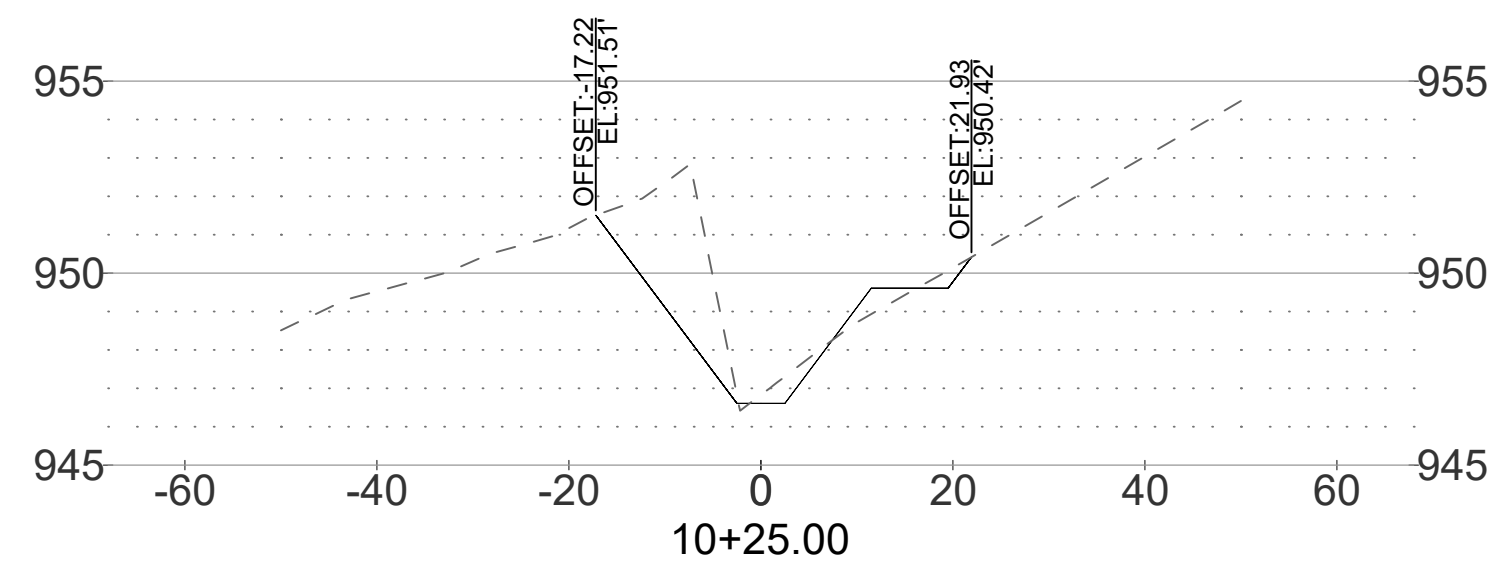
802 FRANCIS STREET  
ST. JOSEPH, MISSOURI 64501  
816-364-5222 | www.snyder-associates.com

**SNYDER & ASSOCIATES**

Project No: 120.0485.11

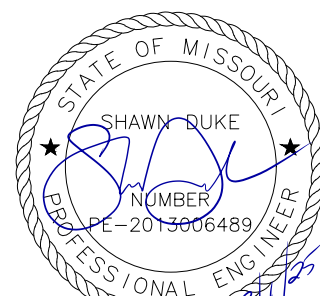
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| Technician: BT | Date: 04-15-2022 |          |  | T-R-S: 47N-32W-24 |                                                     |
|                |                  |          |  |                   | Sheet C3.0                                          |
|                |                  |          |  |                   | Snyder & Associates Engineers & Planners, Inc.      |
|                |                  |          |  |                   | Missouri State Certificate of Authority #2006035544 |



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MO PE#2013006489

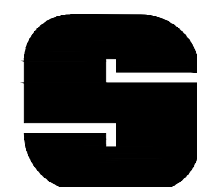
# WHISPERING WOODS CREEK RESTORATION

**LEE'S SUMMIT, MO**

## CHANNEL CROSS SECTIONS

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ENGINEERS & PLANNERS, INC.

ST. JOSEPH, MISSOURI 64501  
816-364-5222 | [www.snyder-associates.com](http://www.snyder-associates.com)



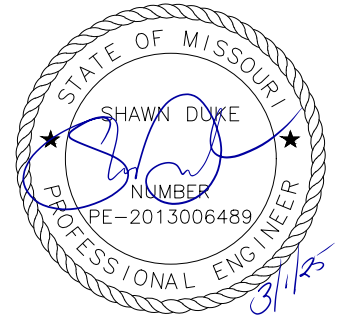
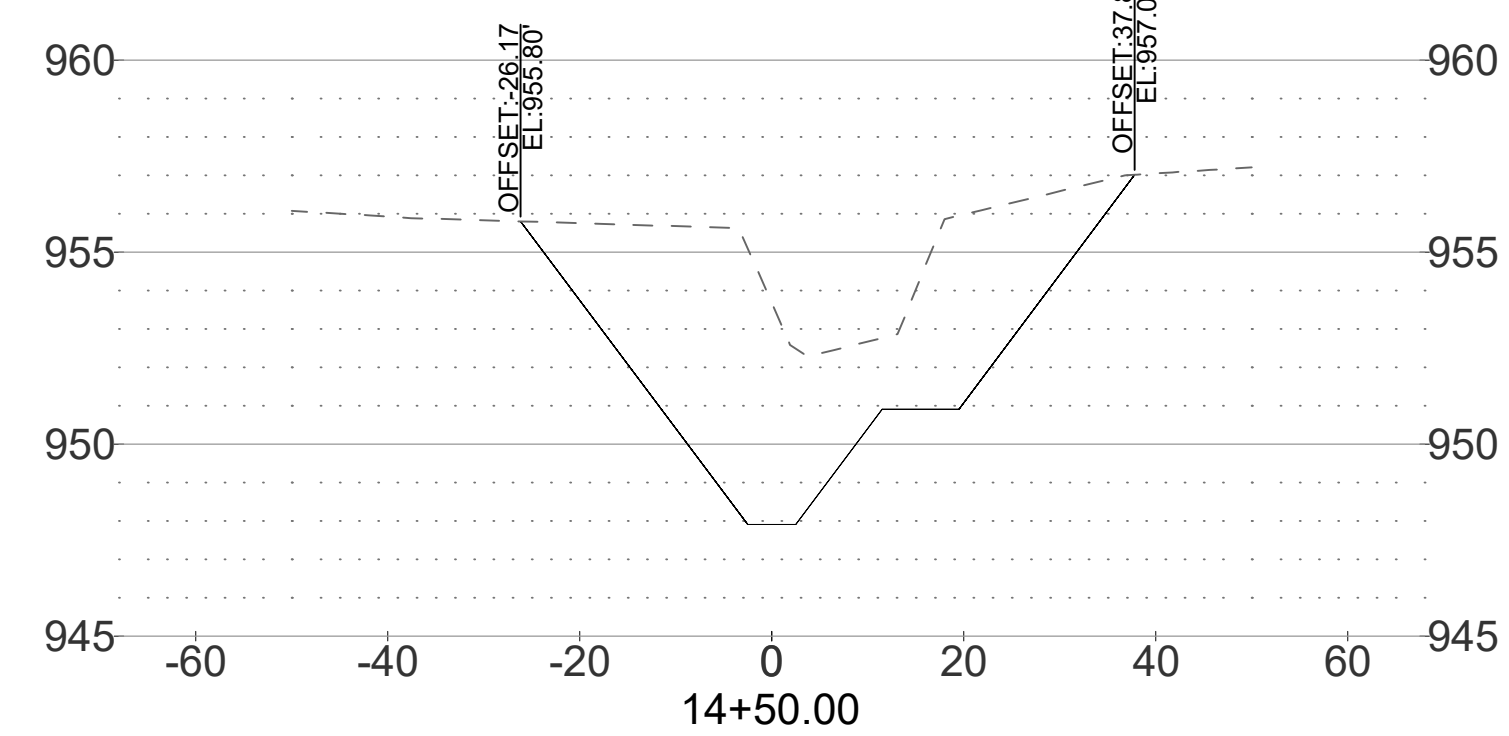
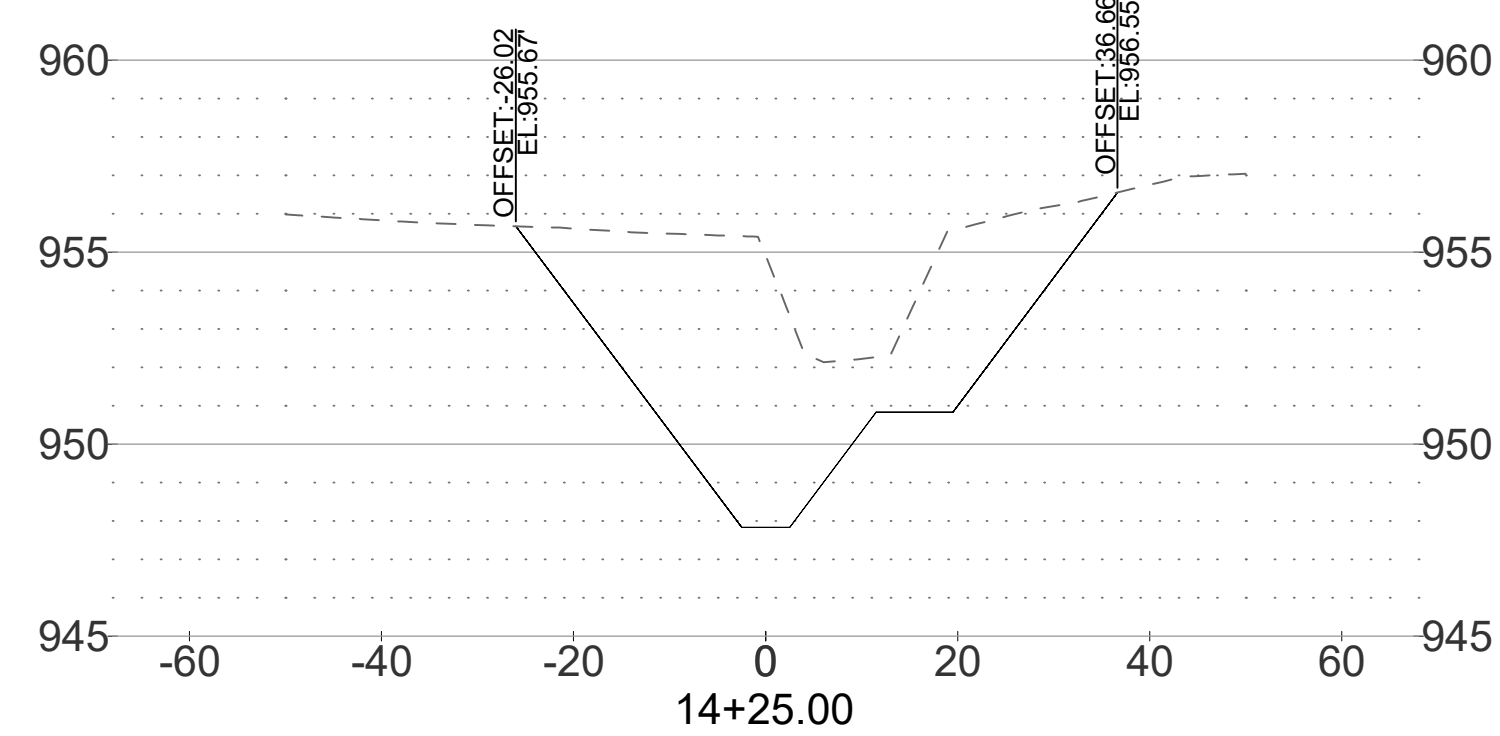
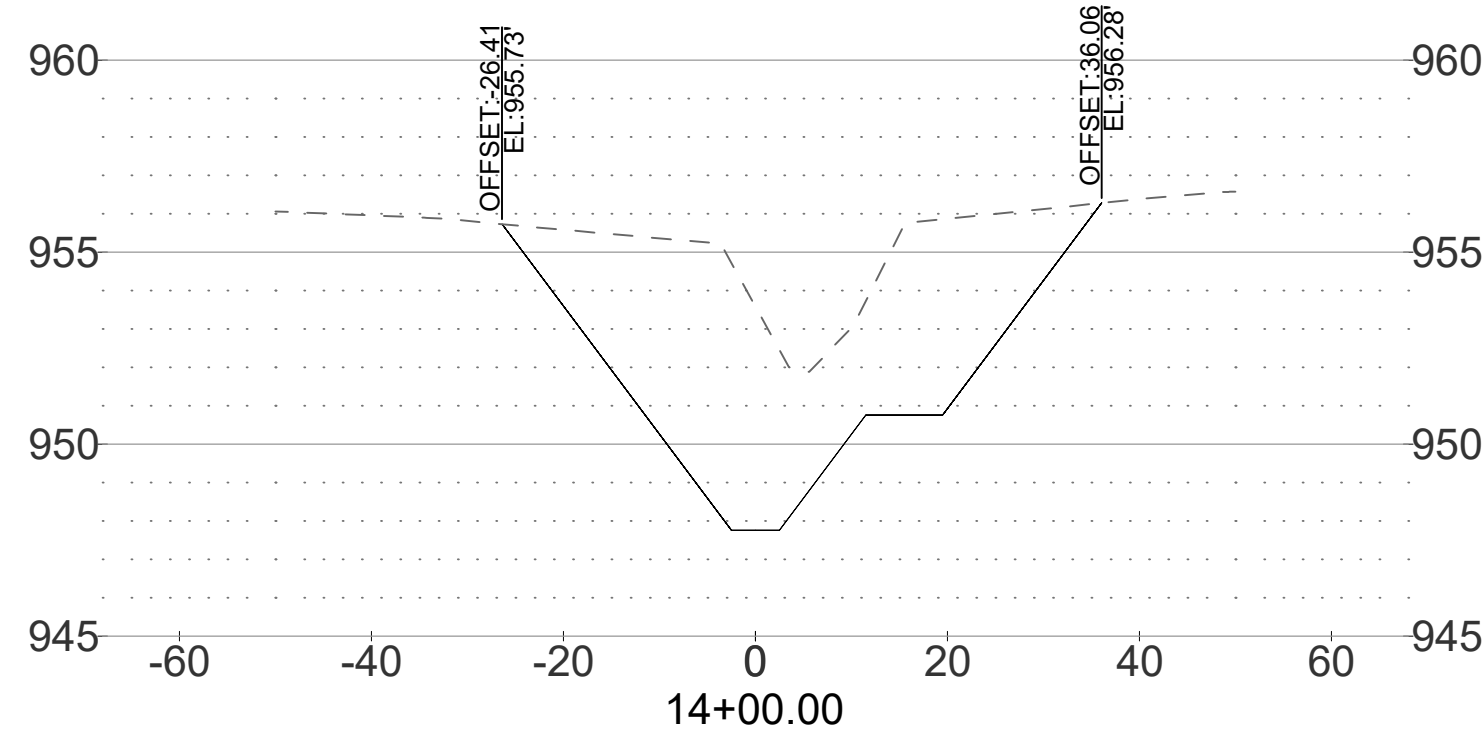
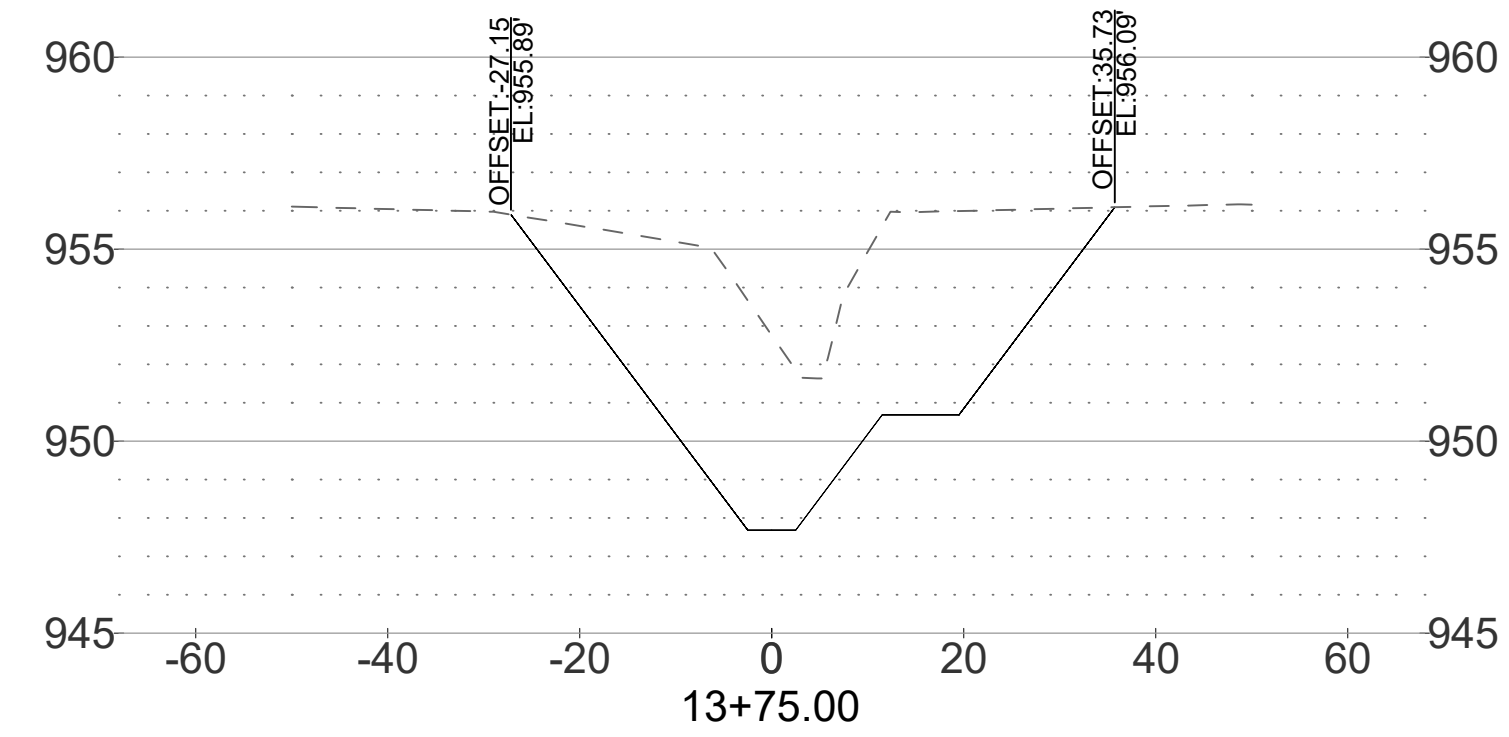
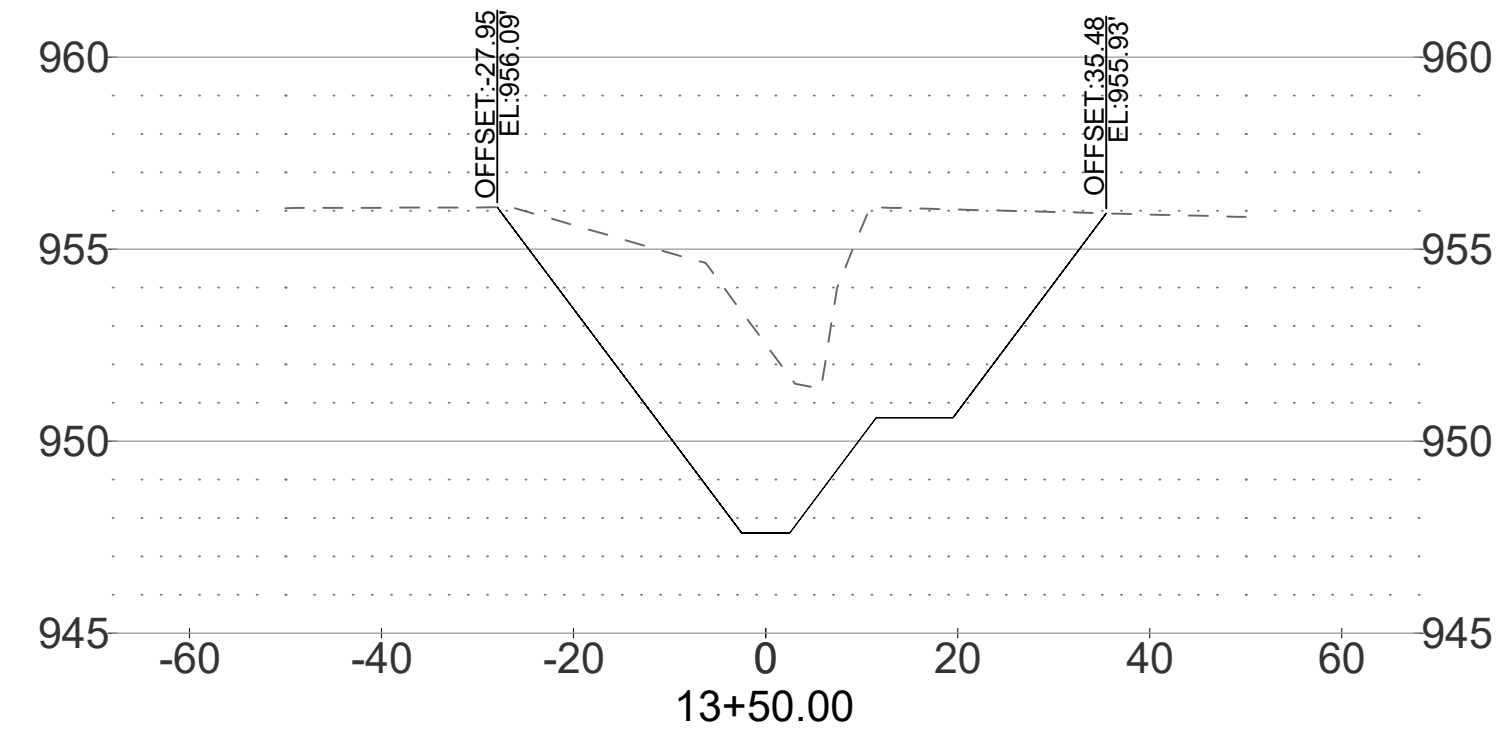
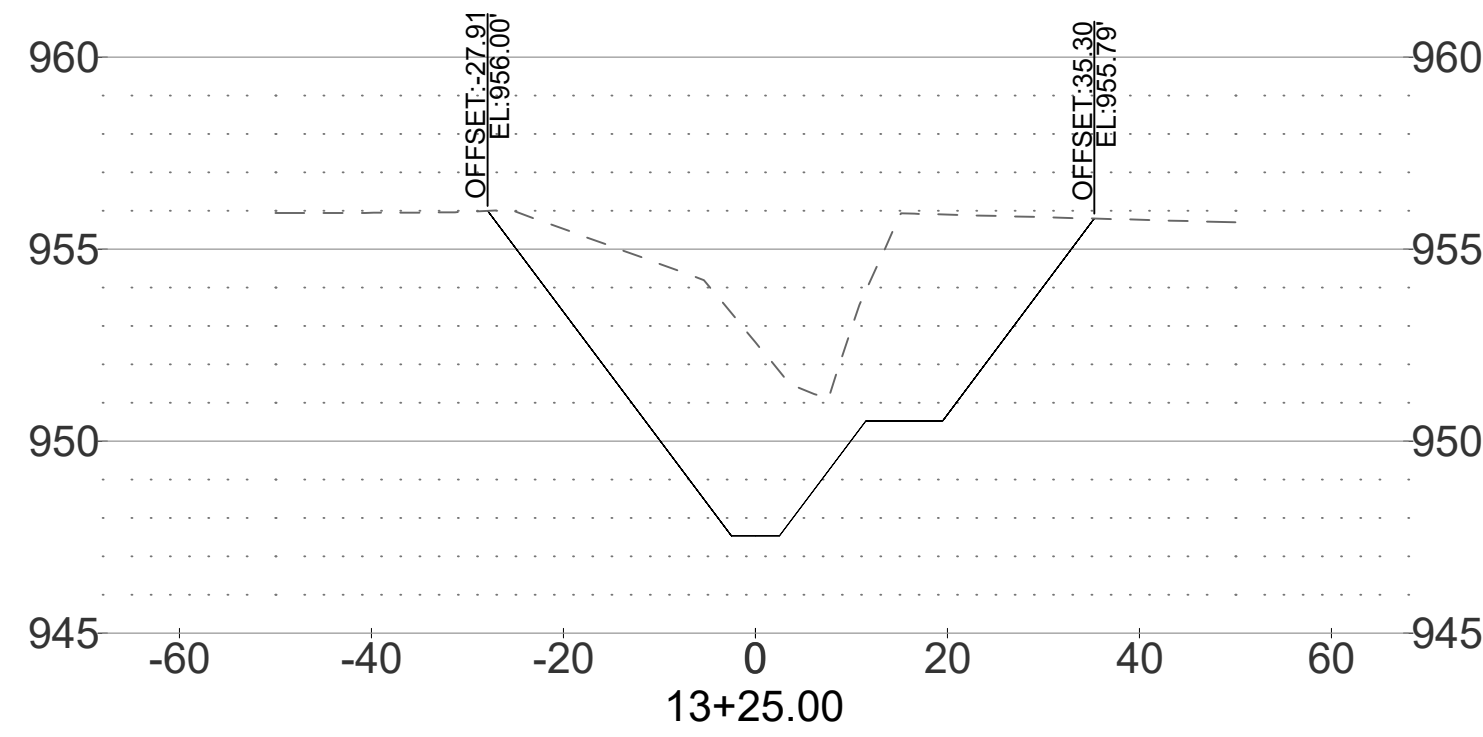
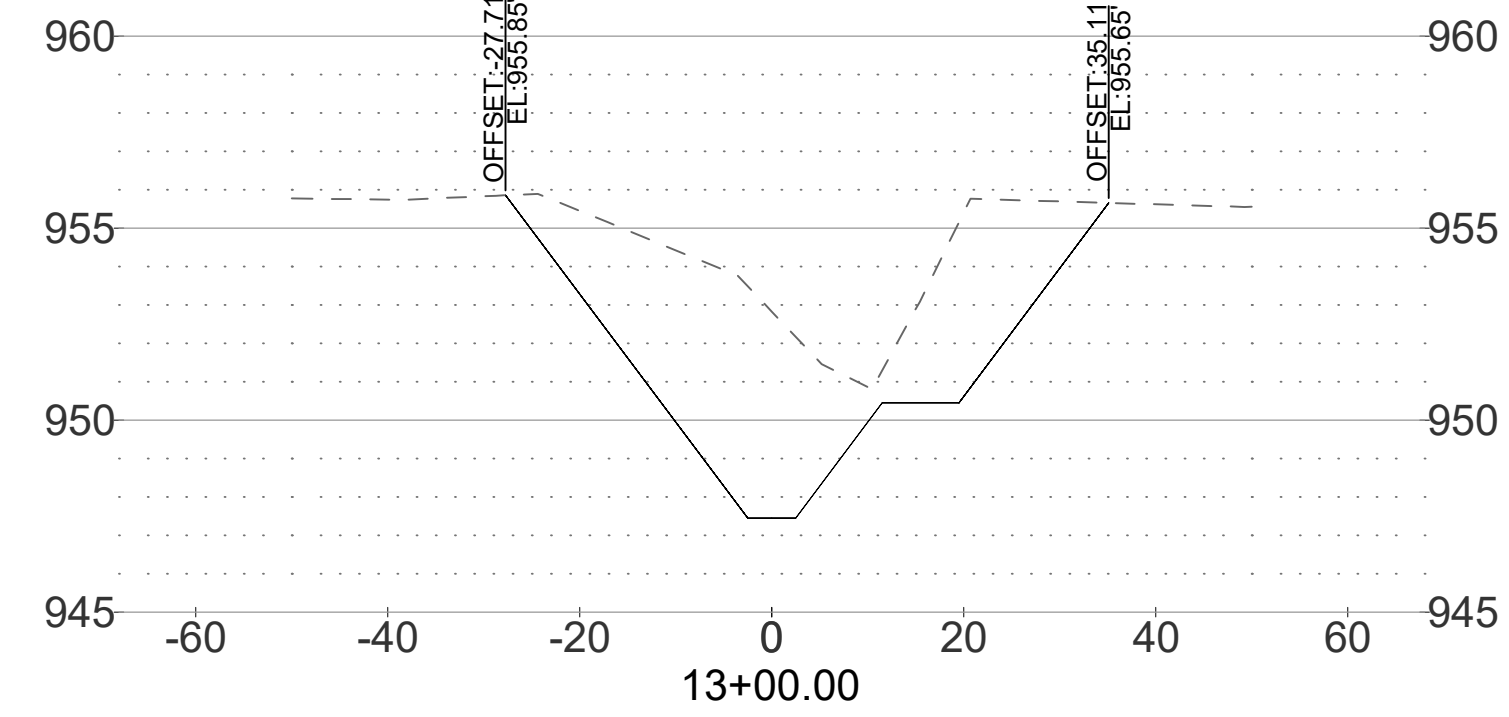
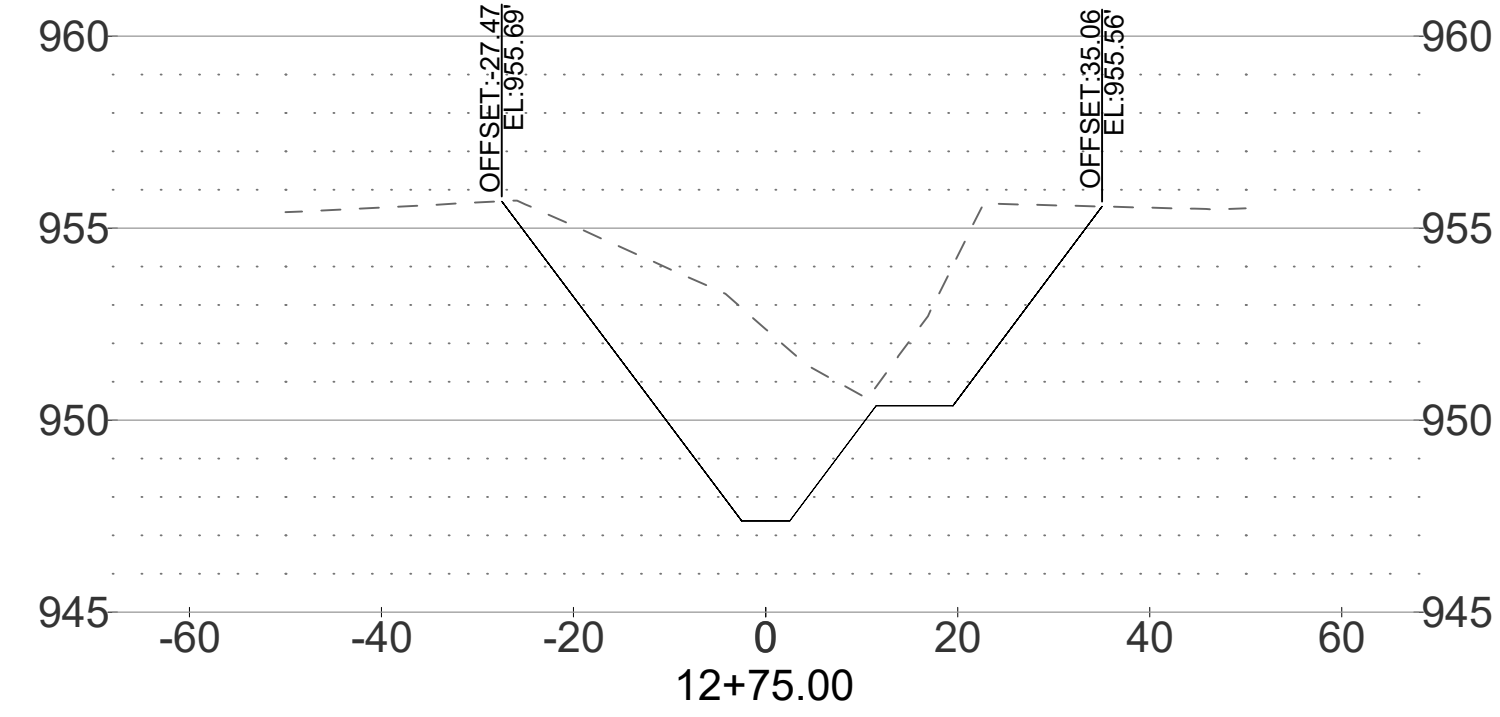
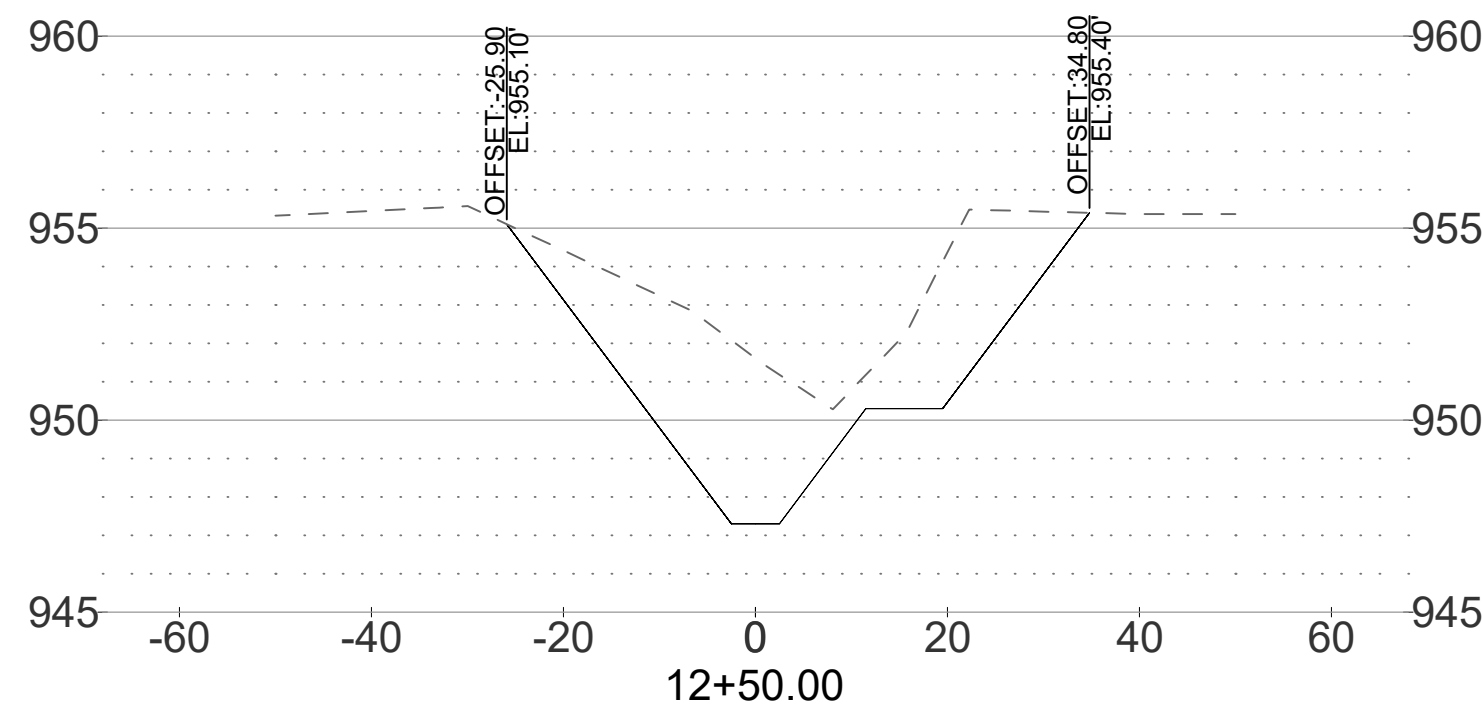
**SNYDER**  
**& ASSOCIATES**

Project No: 120.0485.11

Sheet C3.0

Sheet C3.0





SHAWN DUKE - ENGINEER  
MO PE#2013006489

# WHISPERING WOODS CREEK RESTORATION

**LEE'S SUMMIT, MO**

## CHANNEL CROSS SECTIONS

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ST. JOSEPH, MISSOURI 64501  
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Project No: 120.0485.11

Sheet C3.1

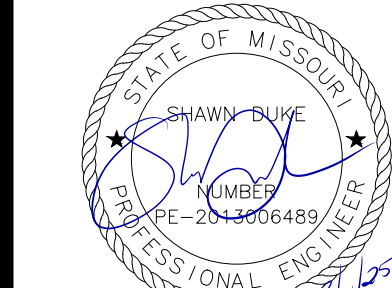
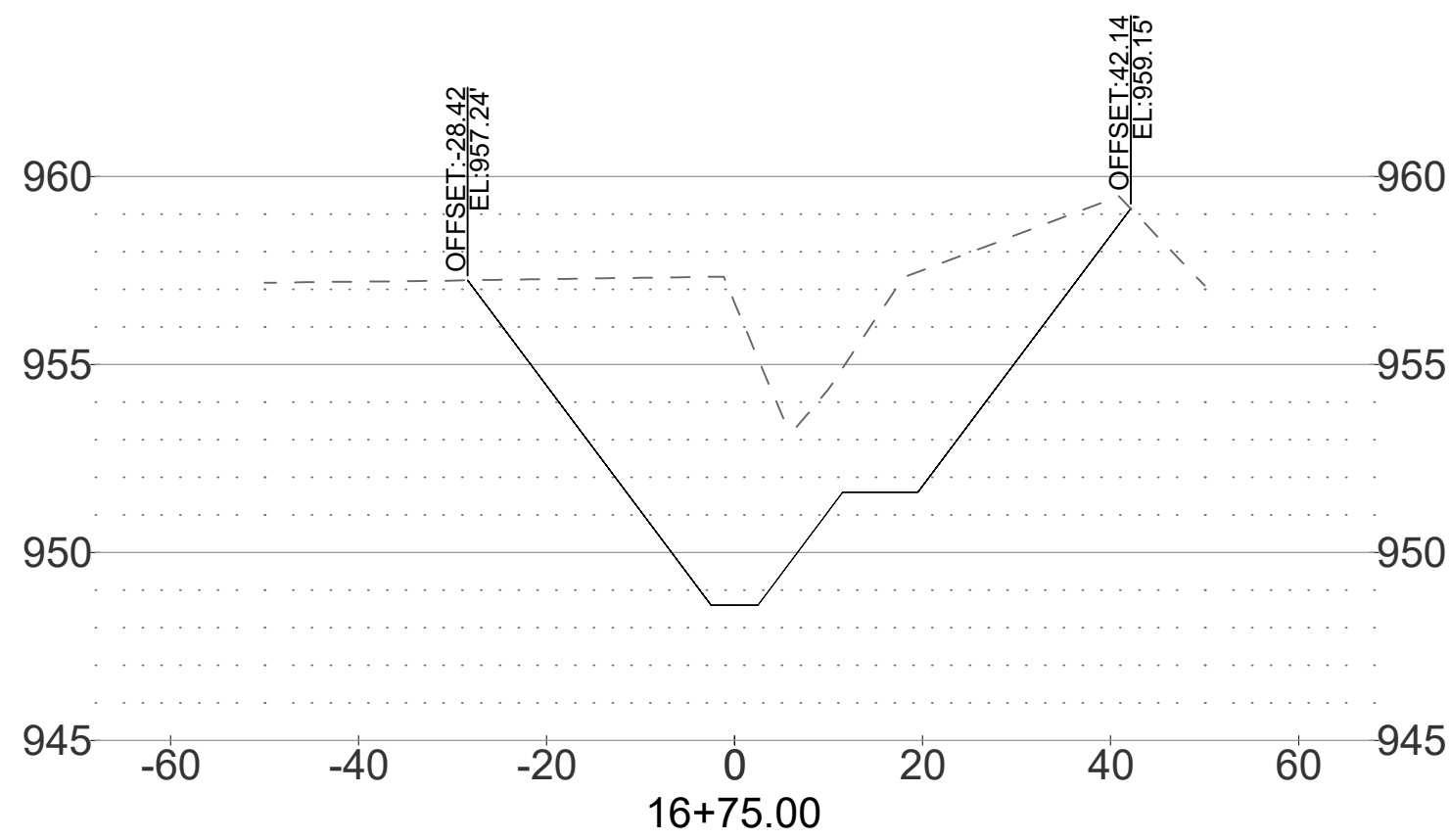
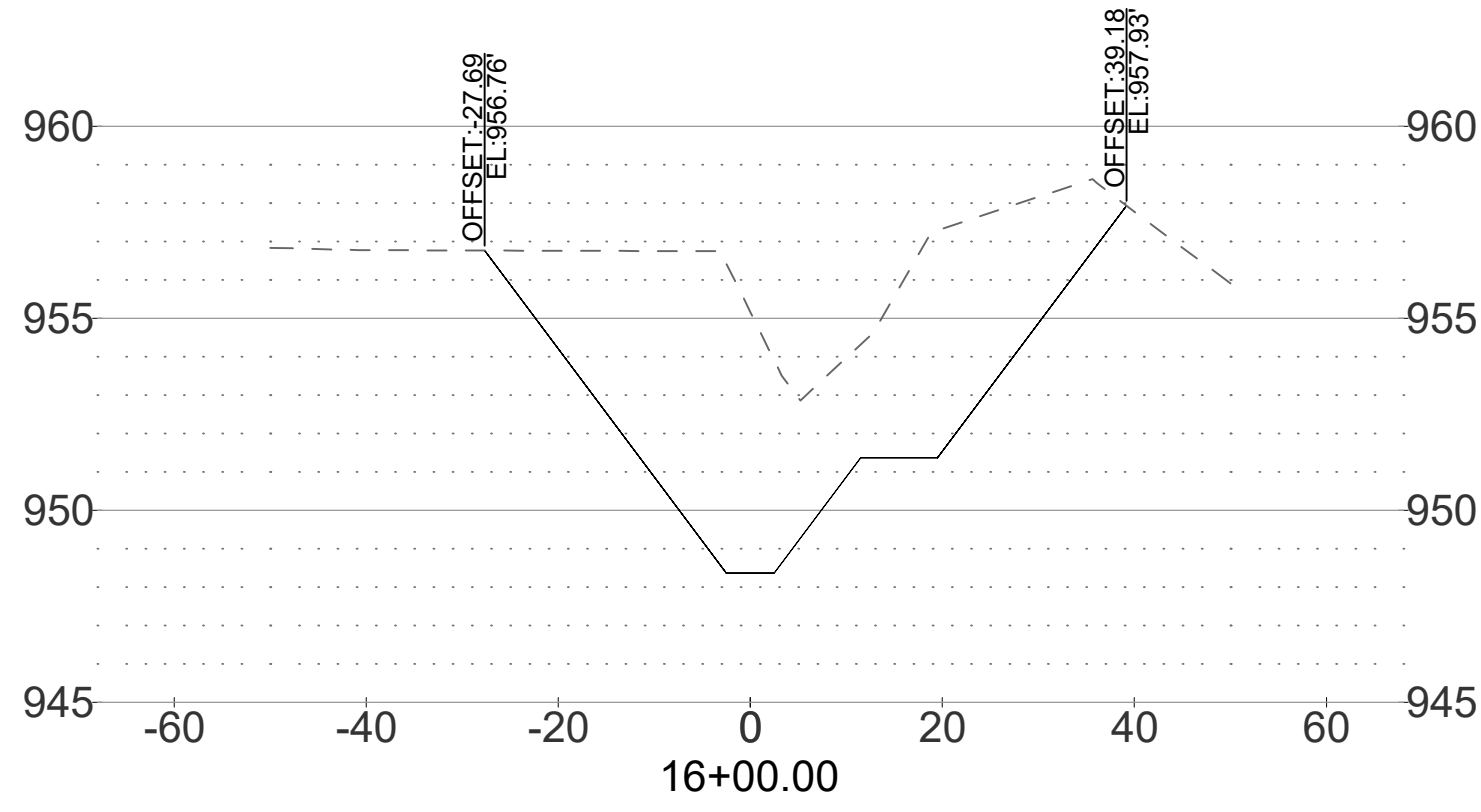
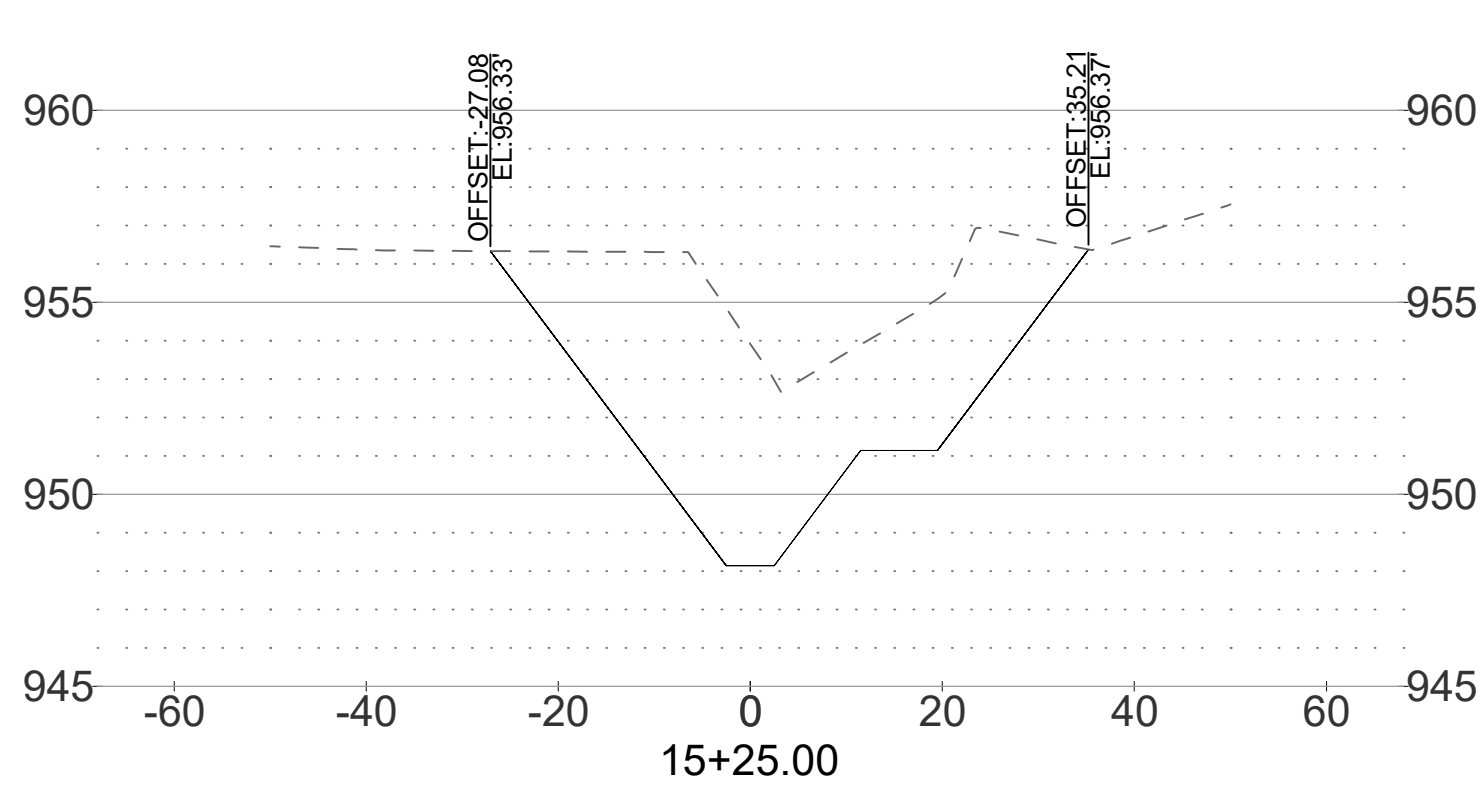
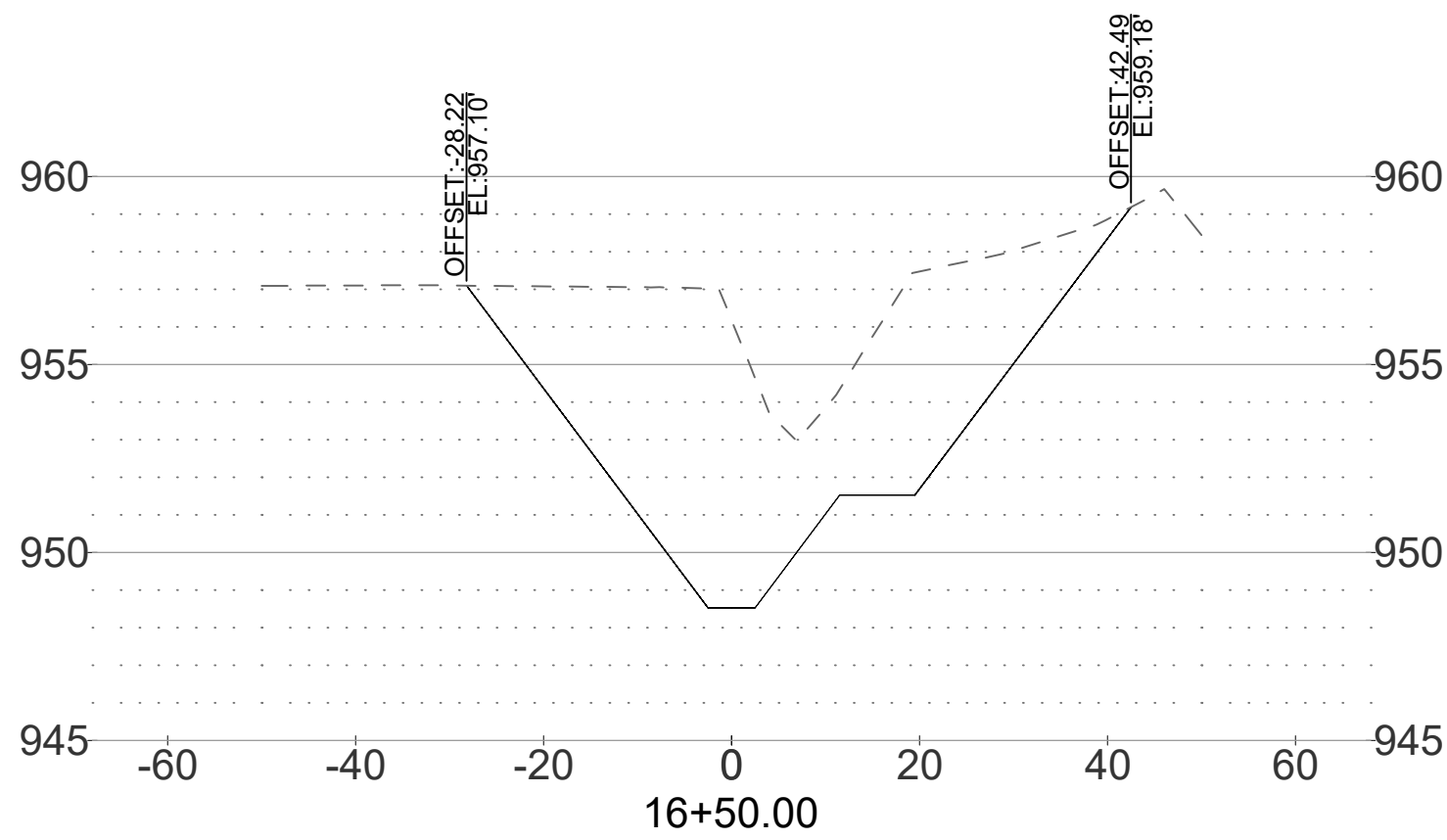
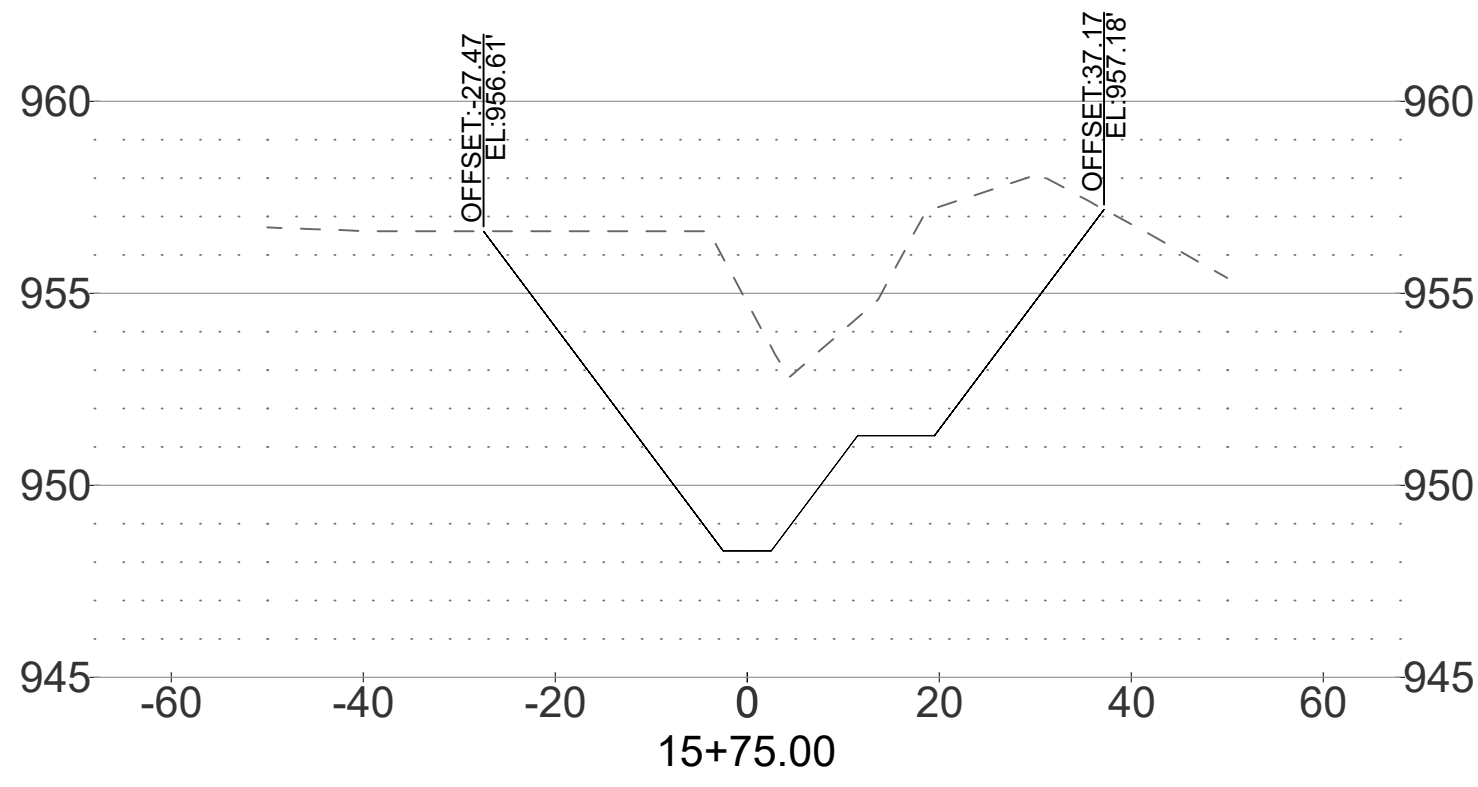
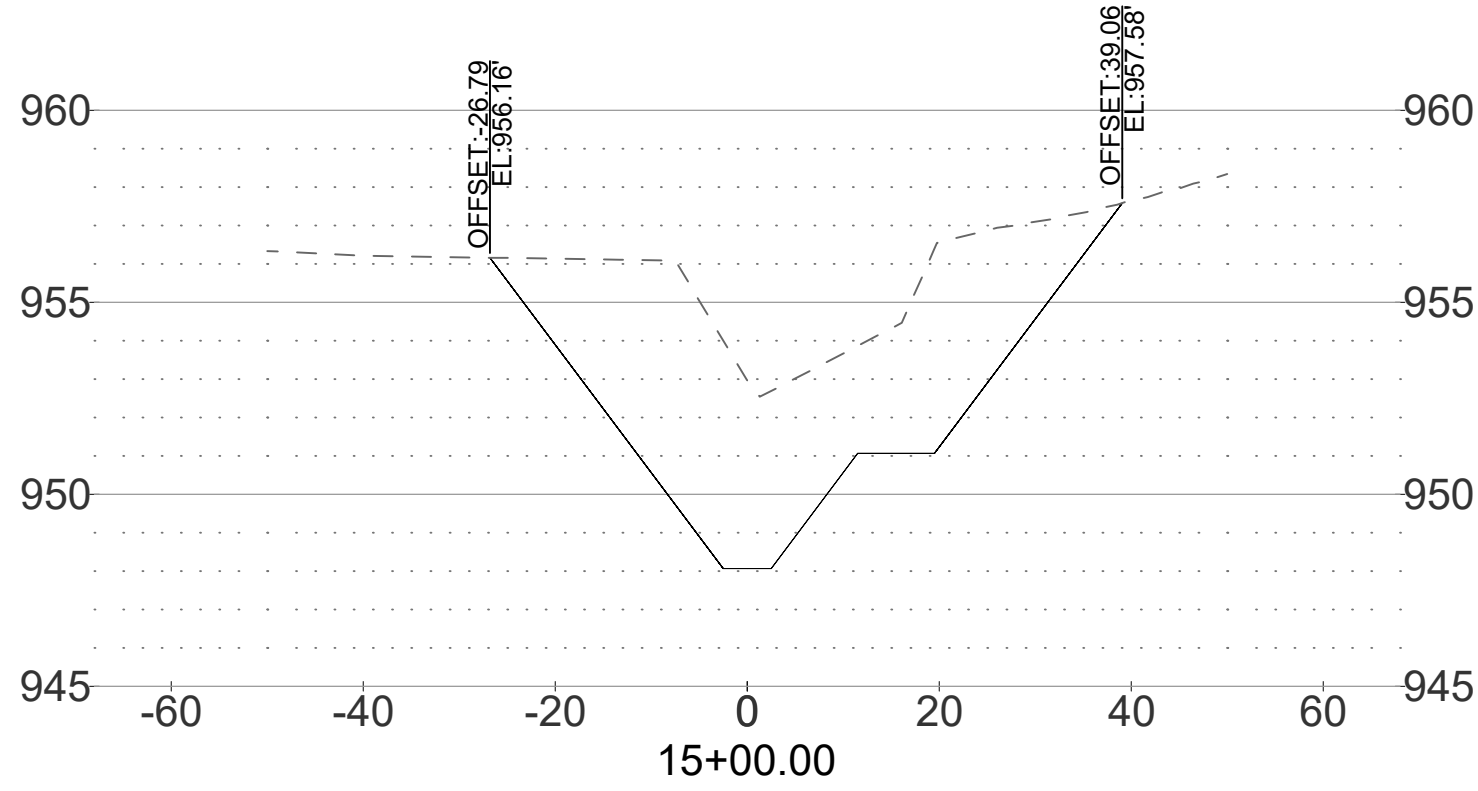
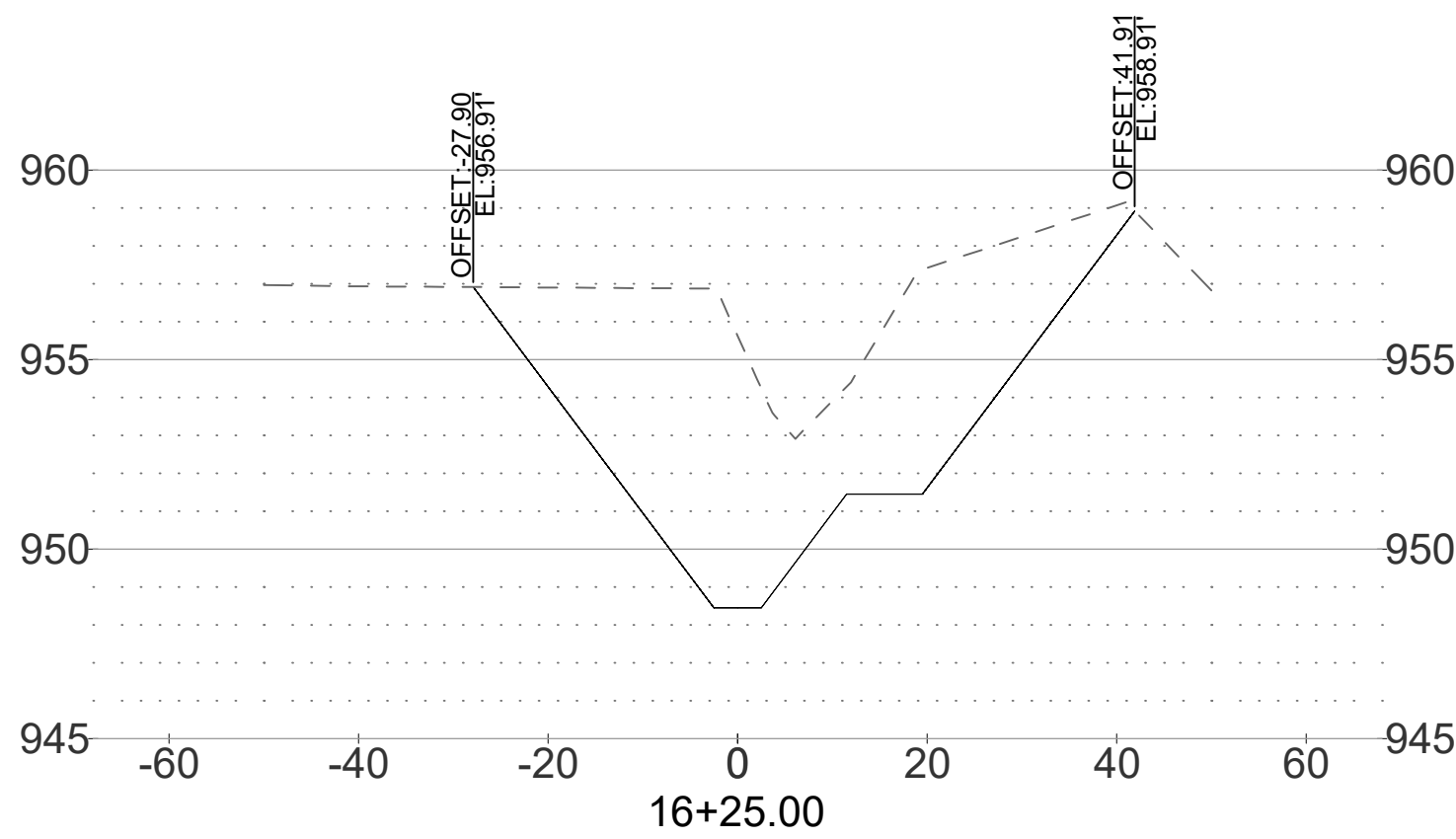
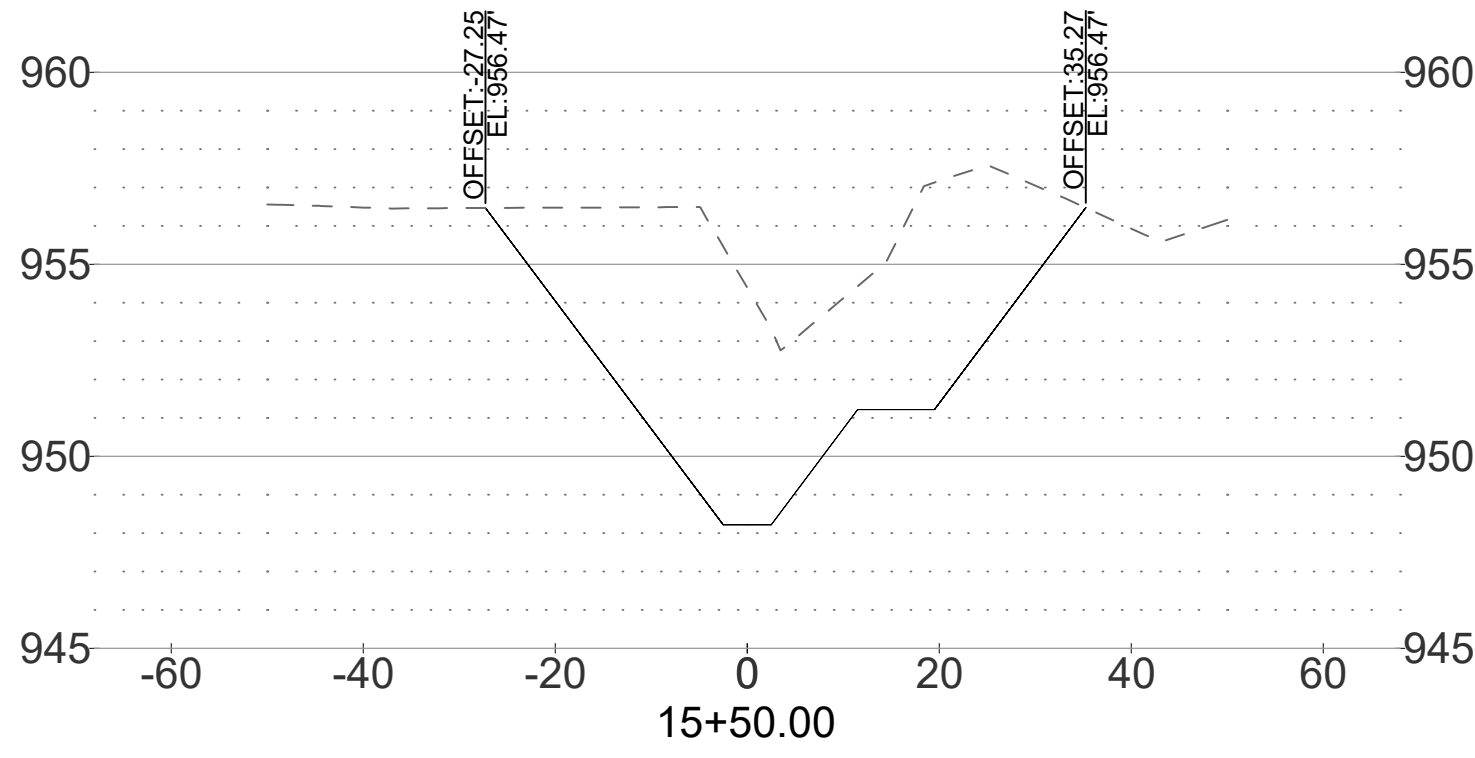
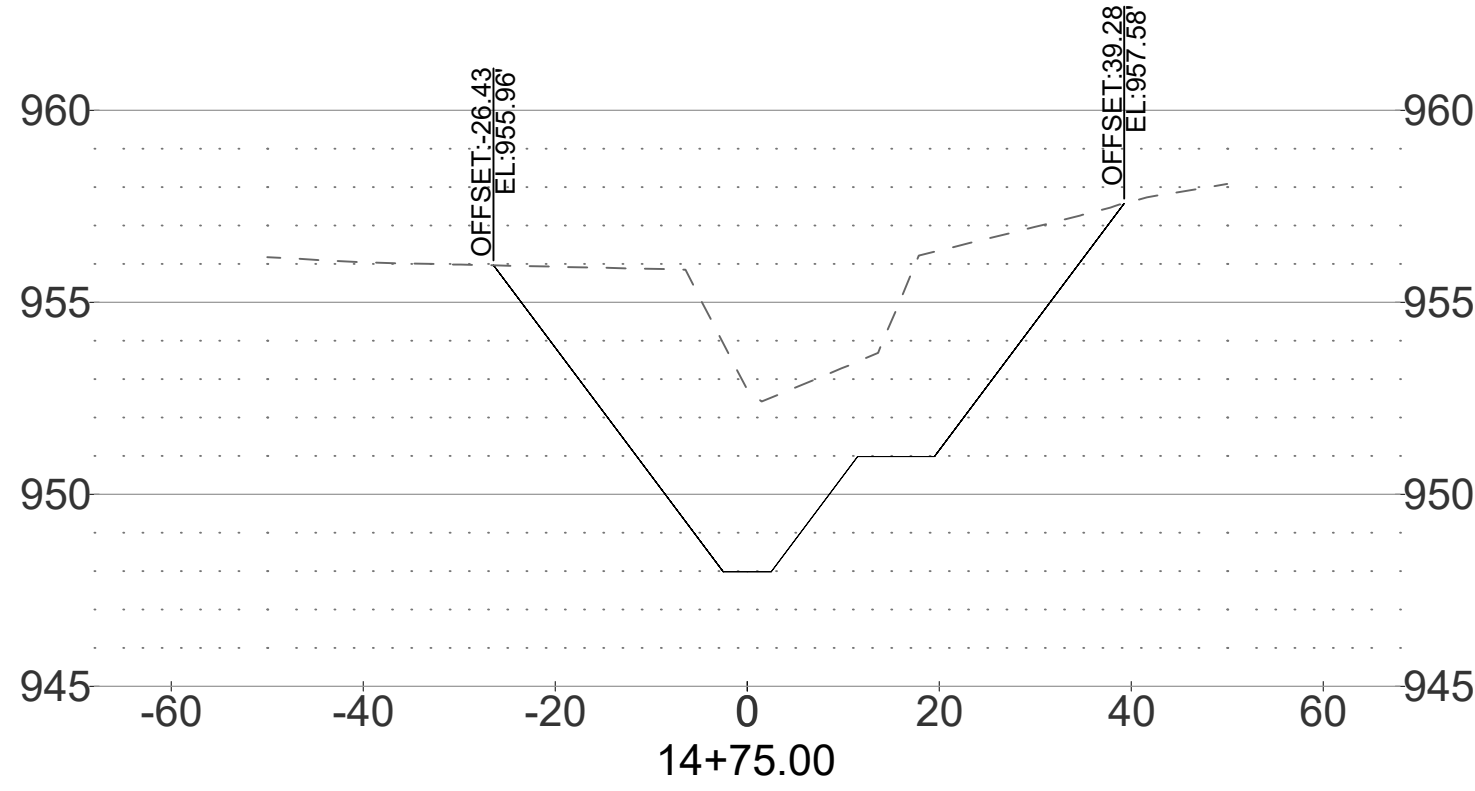
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Missouri State Certificate of Authority #2006008544

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SHAWN DUKE - ENGINEER  
MO PE#2013006489

WHISPERING WOODS CREEK RESTORATION

CHANNEL CROSS SECTIONS

LEE'S SUMMIT, MO

**SNYDER & ASSOCIATES**  
ENGINEERS & PLANNERS, INC.

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ST. JOSEPH, MISSOURI 64501  
816-364-5222 | www.snyder-associates.com



Project No: 120.0485.11

Sheet C3.2

| MARK                                                                                                 | REVISION         | DATE              | BY |
|------------------------------------------------------------------------------------------------------|------------------|-------------------|----|
| Engineer: SD                                                                                         | Checked By: SD   | Scale: 1" = 40'   |    |
| Technician: BT                                                                                       | Date: 04-15-2022 | T-R-S: 47N-32W-24 |    |
| Snyder & Associates Engineers & Planners, Inc.<br>Missouri State Certificate of Authority #206003544 |                  |                   |    |

Sheet C3.2



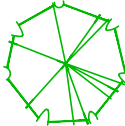




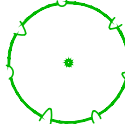
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PLANT LEGEND

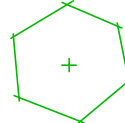
CANOPY TREES



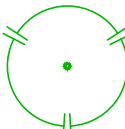
SYCAMORE



SHUMARD RED OAK



BUR OAK



COMMON HACKBERRY

MEDIUM TREES



HOPHORNBEAM



RED HAWTHORNE



FLOWERING DOGWOOD



SERVICEBERRY

SHRUBS



SKY DOGWOOD



ROUGHLEAF DOGWOOD



RED-TWIG DOGWOOD

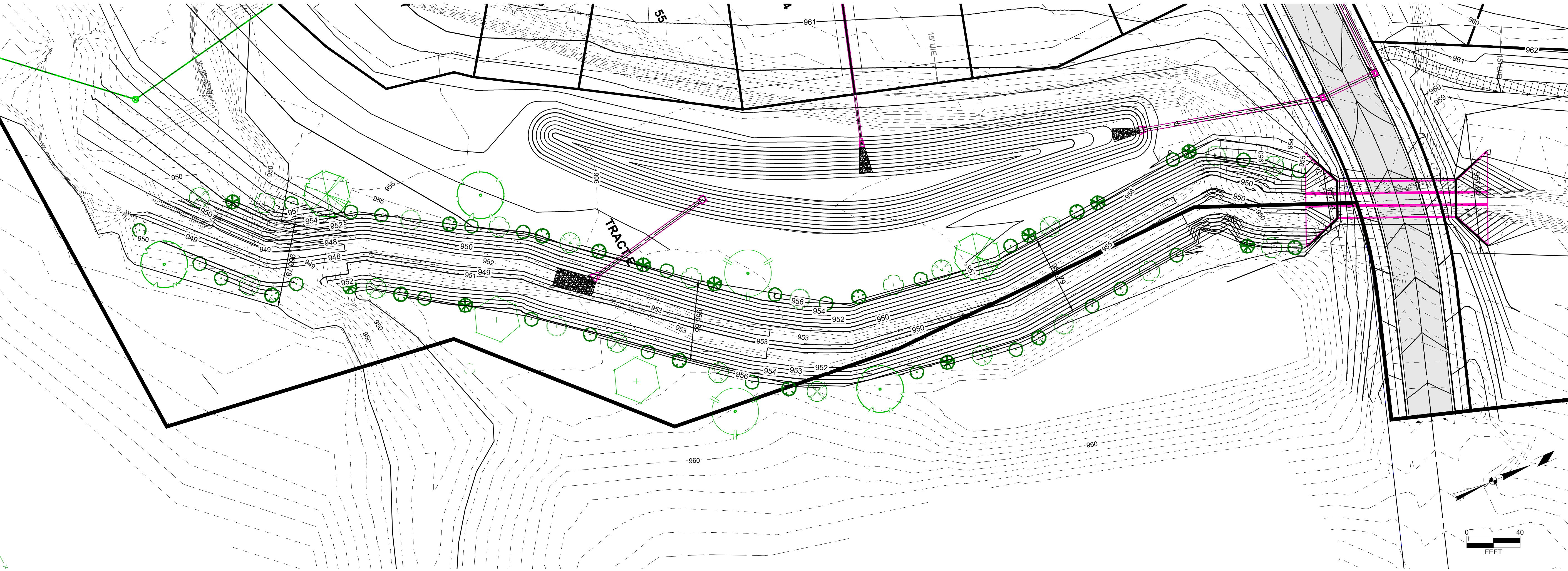


HAZELNUT

TREE AND SHRUB SPECIES LIST

| COMMON NAME       | SCIENTIFIC NAME           | AMOUNT |
|-------------------|---------------------------|--------|
| SHRUBS            |                           |        |
| SKY DOGWOOD       | CORNUS AMOMUM             | 10     |
| ROUGHLEAF DOGWOOD | CORNUS DRUMMONDII         | 16     |
| RED-TWIG DOGWOOD  | CORNUS SERICEA 'CARDINAL' | 11     |
| HAZELNUT          | CORYLUS AMERICANA         | 11     |
| MEDIUM TREES      |                           |        |
| HOPHORNBEAM       | OSTRYA VIRGINIANA         | 5      |
| RED HAWTHORNE     | CRATAEGUS MOLLIS          | 6      |
| FLOWERING DOGWOOD | DIOSPYROS VIRGINIANA      | 6      |
| SERVICEBERRY      | AMELANCHIER ARBOREA       | 5      |
| CANOPY            |                           |        |
| BUR OAK           | QUERCUS MACROCARPA        | 2      |
| SHUMARD RED OAK   | QUERCUS SHUMARDII         | 3      |
| SYCAMORE          | PLANTANUS OCCIDENTALIS    | 2      |
| HACKBERRY         | CELTIS OCCIDENTALIS       | 2      |

NI = NO INDICATOR



WHISPERING WOODS CREEK RESTORATION

LANDSCAPE - TREES

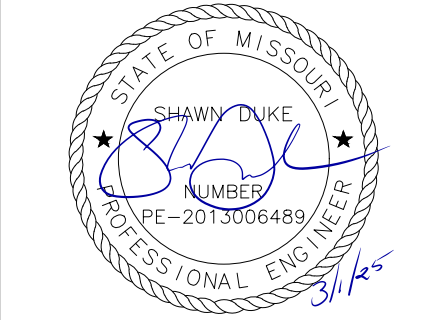
LEE'S SUMMIT, MO

**SNYDER & ASSOCIATES**  
ENGINEERS & PLANNERS, INC.



Project No: 120.0485.11

Sheet C4.0



SHAWN DUKE - ENGINEER  
MO PE#2013006489

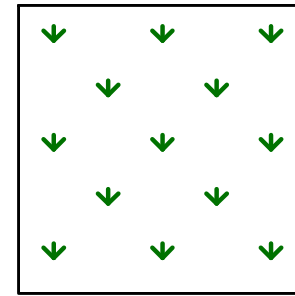
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| Technician: BT | Date: 04-15-2022 | T-R-S, 47N-32W-24 |    |

Snyder & Associates Engineers & Planners, Inc.  
Missouri State Certificate of Authority #206008544

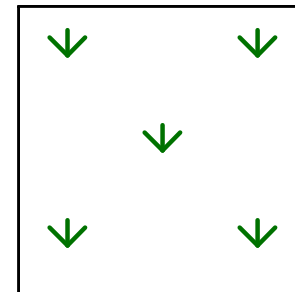
Sheet C4.0



FORBS, & WETLANDS

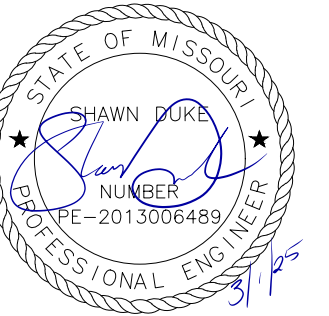
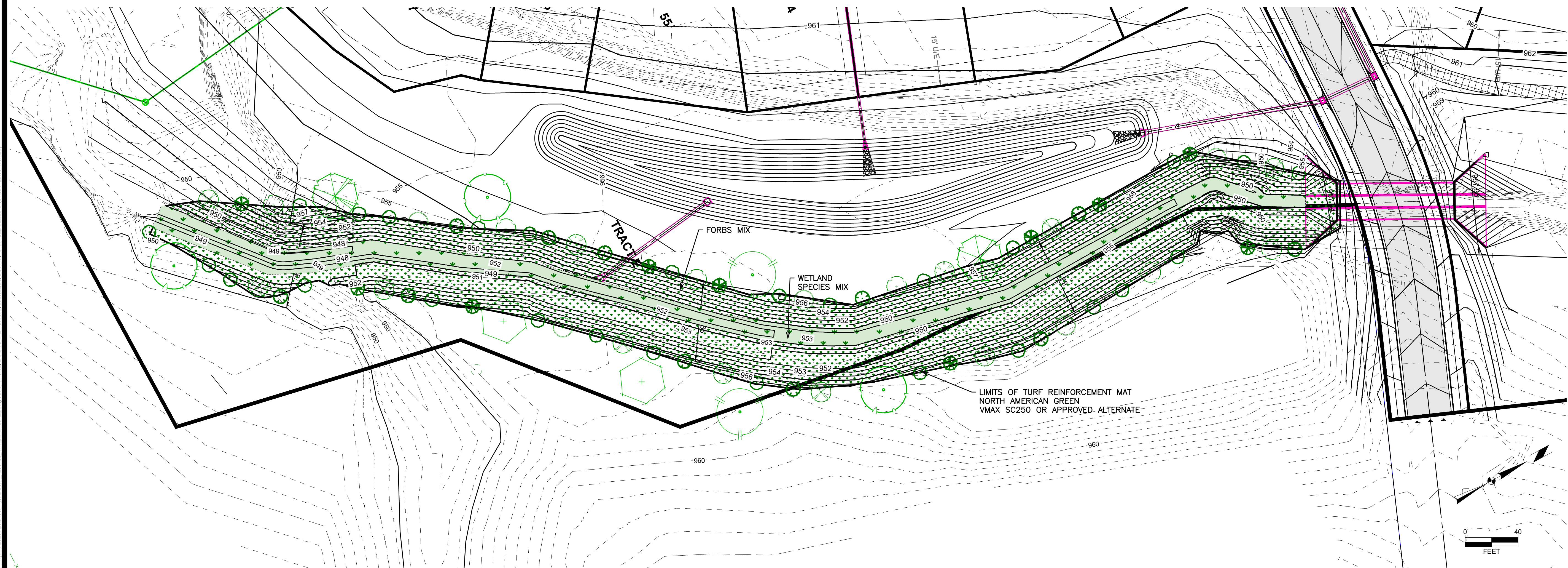


FORBS MIX: (TOTAL 44,869 SF 1.03AC)



WETLAND SPECIES MIX (TOTAL: 12,515 SF .29 AC)

| COMMON NAME           | SCIENTIFIC NAME                 | AMOUNT       |
|-----------------------|---------------------------------|--------------|
| FORBS                 |                                 |              |
| PARTRIDGE PEA         | <i>CHAMAECRISTA FASCICULATA</i> | 4.0 LBS/ACRE |
| BLACK-EYED SUSAN      | <i>RUDBECKIA HIRTA</i>          | 0.5 LBS/ACRE |
| YELLOW CONEFLOWER     | <i>RATIBIDA PINNATA</i>         | 0.5 LBS/ACRE |
| PURPLE CONEFLOWER     | <i>ECHINACEA PURPUREA</i>       | 2.0 LBS/ACRE |
| PURPLE PRAIRIE CLOVER | <i>DALEA PURPUREA</i>           | 0.5 LBS/ACRE |
| WETLANDS              |                                 |              |
| DARK GREEN BULRUSH    | <i>SCIRPUS ATROVIRENS</i>       | 128 PLUGS    |
| SOFTSTEM BULRUSH      | <i>SCIRPUS VALIDUS</i>          | 128 PLUGS    |
| RIVER BULRUSH         | <i>SCIRPUS FLUVIATILIS</i>      | 128 PLUGS    |
| PRAIRIE CORDGRASS     | <i>SPARTINE PECTINATA</i>       | 128 PLUGS    |
| SWITCHGRASS           | <i>PANICUM VIRGATUM</i>         | 1.0 LBS/ACRE |
| FOX SEDGE             | <i>CAREX VULPINOIDEA</i>        | 0.5 LBS/ACRE |
| COW PARSNIP           | <i>HERACLEUM MAXIMUM</i>        | 3.5 LBS/ACRE |
| VIRGINIA WILD RYE     | <i>ELYMUS VIRGINICUS</i>        | 6.0 LBS/ACRE |
| SMARTWEED             | <i>POLYGONUM PENNSYLVANICUM</i> | 1.5 LBS/ACRE |
| BLUE VERVAIN          | <i>VERBENA HASTATA</i>          | 0.5 LBS/ACRE |
| GOLDEN ALEXANDER      | <i>ZIZIA AUREA</i>              | 1.0 LBS/ACRE |



SHAWN DUKE - ENGINEER  
MO PE#2013006489

# WHISPERING WOODS CREEK RESTORATION

**LEE'S SUMMIT, MO**

**SNYDER & ASSOCIATES** |  
**ENGINEERS & PLANNERS, INC.**

802 FRANCIS STREET  
ST. JOSEPH, MISSOURI 64501  
816-364-5222 | [www.snyder-associates.com](http://www.snyder-associates.com)



Project No: 120.0485.11

Sheet C4.1

Sheet C4.1

Snyder & Associates Engineers & Planners, Inc.  
Missouri State Certificate of Authority #2006008544





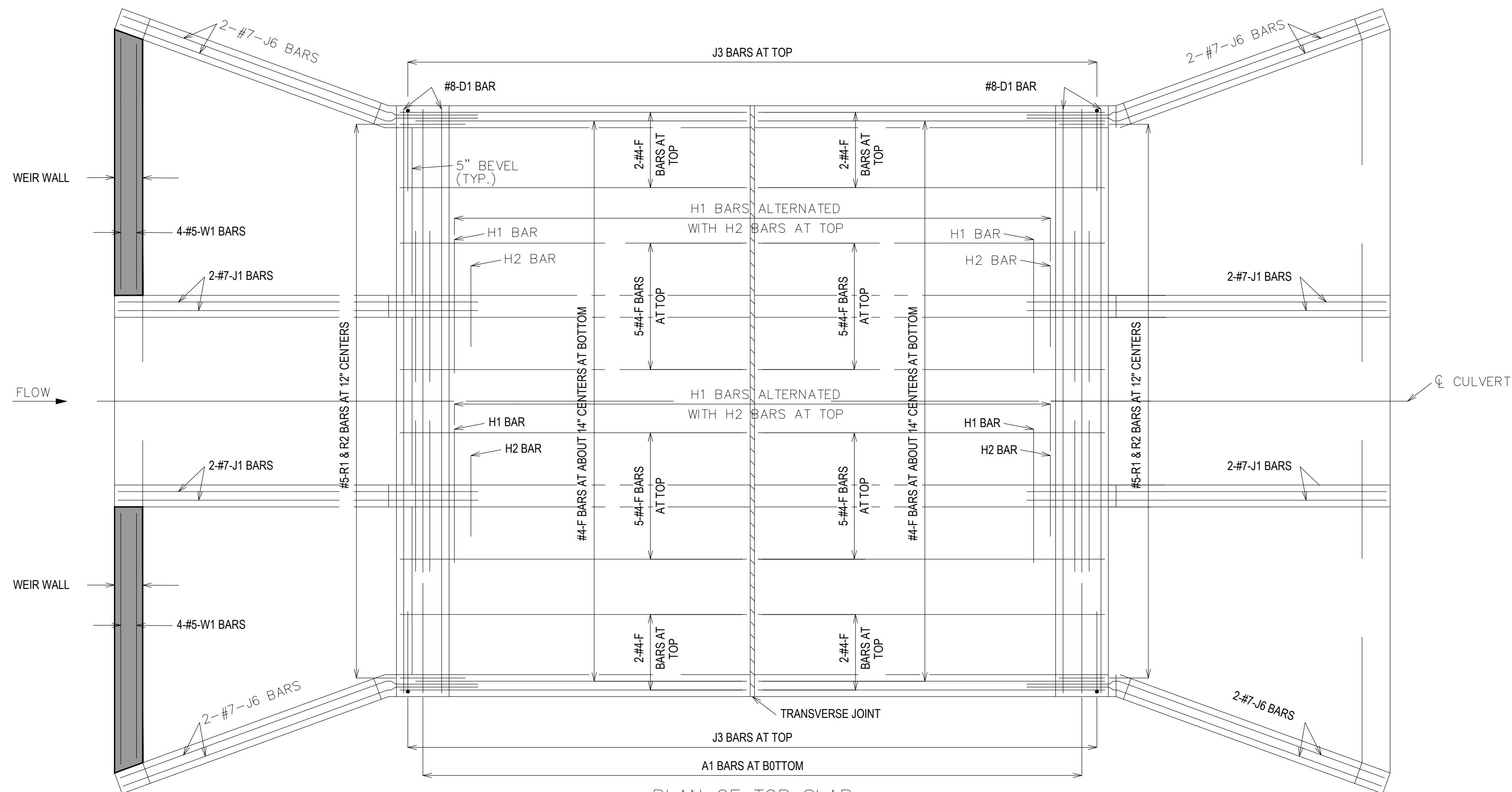




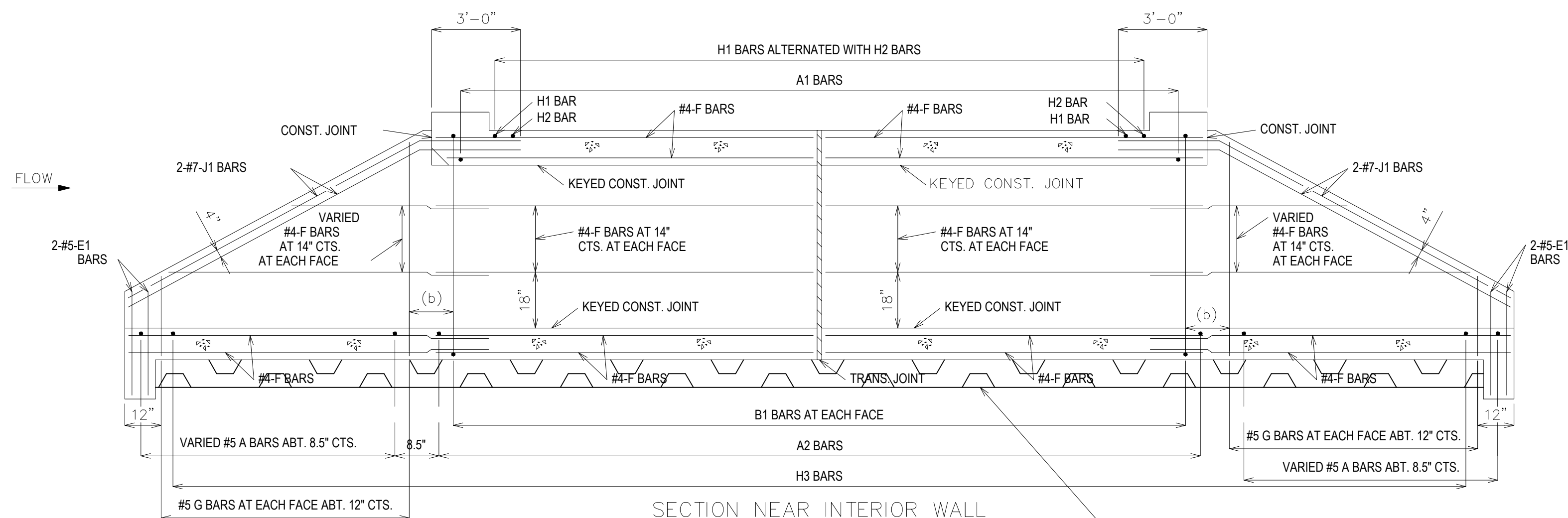
Sheet C5.1



V:\Projects\2020\120 DABE, 11C-DD1120485 Box Culvert Elevation Details.dwg SHAWN DUKE, BOX CULVERT DETAILS, 20250308, 11:09 AM, ANSI FULL BLEED D (34.00 X 22.00 INCHES)



PLAN OF TOP SLAB  
B BARS IN WALLS ARE NOT SHOWN FOR CLARITY.  
FOR PLACEMENT, SEE DETAIL SHEET C5.1.



SECTION NEAR INTERIOR WALL  
J1 BARS MAY BE BENT IN FIELD OR SHOP.

GRADE SLAB PER LEE'S SUMMIT DCM  
SECTION 2604.3.D

#### GENERAL NOTES:

PER LEE'S SUMMIT DCM:  
2604.3.D. Cast-in-Place Box Culvert Support Slab:  
Cast in place box culverts shall have a 3 inch thick grade slab cast under the bottom slab with 6" crushed stone under grade slab.  
The grade slab shall be at least as wide as the structure and shall stop short of the toe walls.  
Commercial grade concrete may be used with minimum 2500 psi compressive strength.  
The slab should be set with proper grade control to match the elevations required for the culvert.

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE DETAIL SHEET C5.3.  
FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT  
SEE DETAIL SHEET C5.5.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND  
SECTION, SEE DETAIL SHEET C5.3 FOR DETAILS.

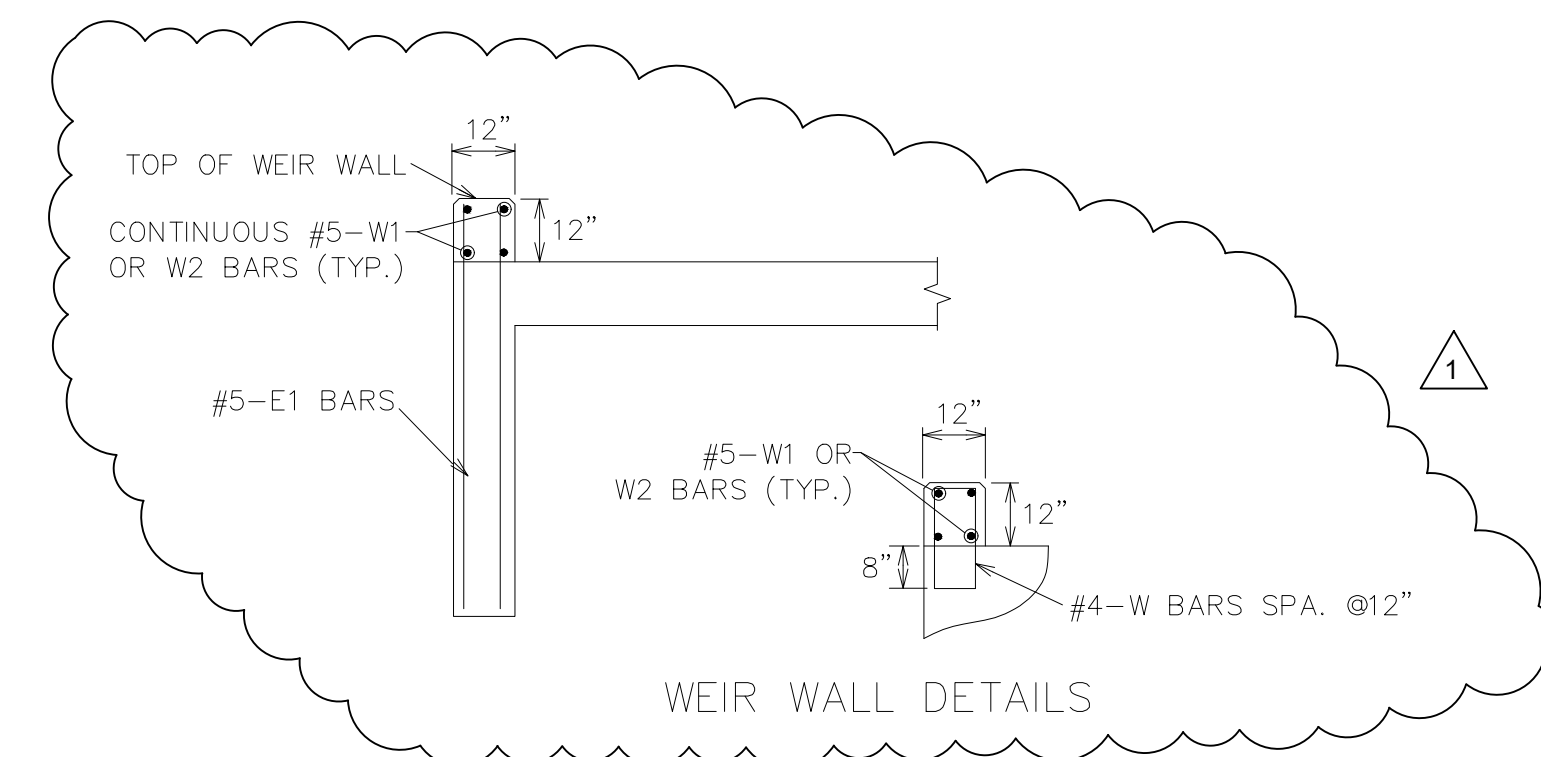
DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(b) VARIES, 12" MAXIMUM



## WHISPERING WOODS CREEK RESTORATION

### BOX CULVERT DETAILS

LEE'S SUMMIT, MO

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Project No: 120.0485.11

Sheet C5.2

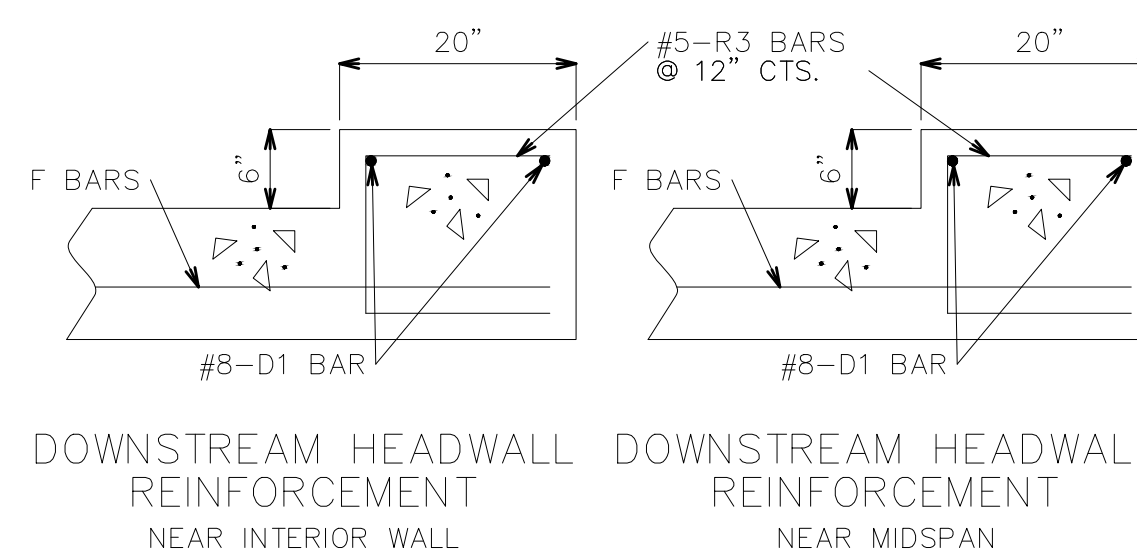
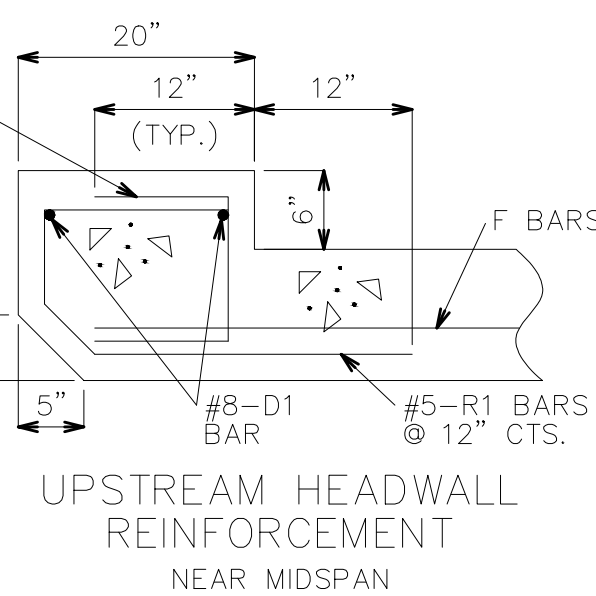
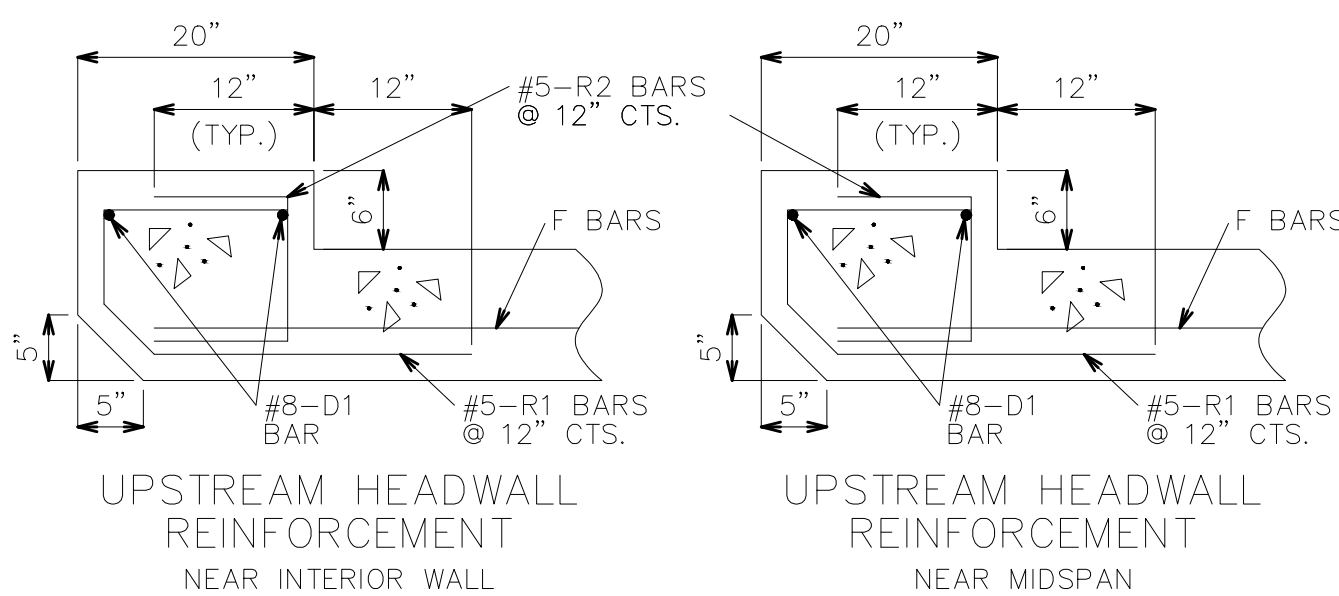
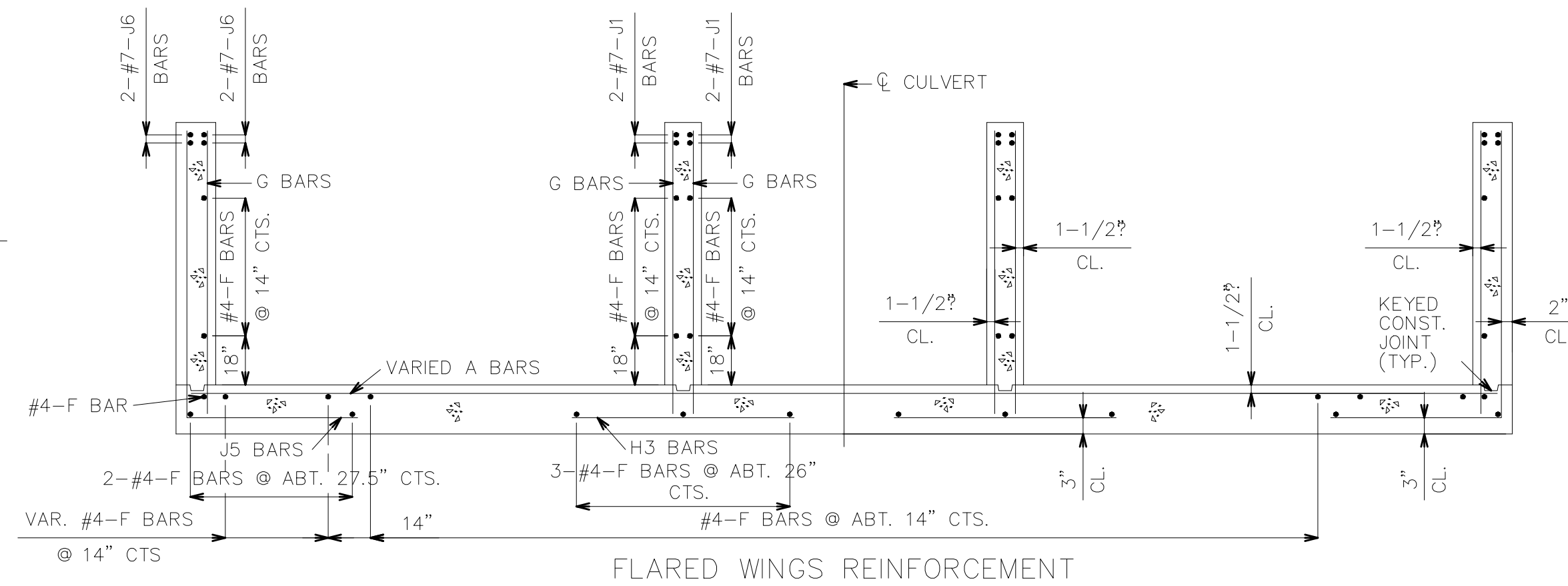
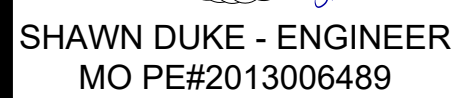


SHAWN DUKE - ENGINEER  
MO PE#2013006489

| MARK                                                                                                  | REVISION                    | DATE              | BY |
|-------------------------------------------------------------------------------------------------------|-----------------------------|-------------------|----|
| 1                                                                                                     | REVISIONS PER CITY COMMENTS | 1/2/25            | MT |
| Engineer: SD                                                                                          | Checked By: SD              | Scale: 1" = 5'    |    |
| Technician: BT                                                                                        | Date: 04-15-2022            | T-R-S, 47N-32W-24 |    |
| Snyder & Associates Engineers & Planners, Inc.<br>Missouri State Certificate of Authority #2006008544 |                             |                   |    |

Sheet C5.2



[illegible]

**SNYDER & ASSOCIATES**  
**ENGINEERS & PLANNERS, INC.**



Project No: 120.0485.11

Sheet C5.3









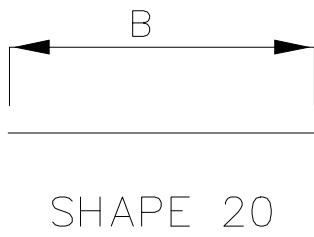
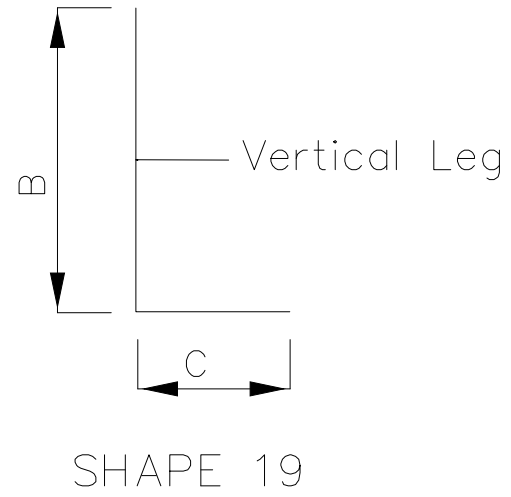
| WALL BARS |         |         |         |     |
|-----------|---------|---------|---------|-----|
| B1 BARS   |         | B2 BARS |         |     |
| SIZE      | SPACING | SIZE    | SPACING | G1  |
| #5        | 12"     | #5      | 12"     | 12" |

|             |             |
|-------------|-------------|
| Project No: | 120.0485.11 |
| Sheet       | C5.5        |

\\projects\2020\120.0485.11\CADD\1200485 Box Culvert Flared\DTLS.dwg JOHN STONE, BOX CULVERT DETAILS, 2025/02/26, 9:54 AM, ANSI FULL BLEED D (34.00 X 22.00 INCHES)

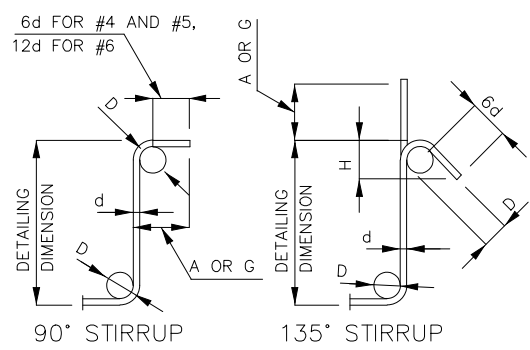


| BILL OF REINFORCING STEEL |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|---------------------------|-----------|----------------------|-----------|-----------|-------------|------------|------------|----------|------------|--------|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|----------------|-----|---------------|-----|--------|
| NO REQD.                  | MARK NO.  | LOCATION             | EPOXY (E) | SHAPE NO. | STIRRUP (S) | SUBSTR (X) | VARIES (V) | NO. EACH | DIMENSIONS |        |     |       |     |     |     |     |     |     |     |     | NOMINAL LENGTH |     | ACTUAL LENGTH |     | WEIGHT |
|                           | B         |                      |           |           |             |            |            |          | C          |        | D   |       | E   |     | F   |     | H   |     | K   |     |                |     |               |     |        |
|                           | SIZE MARK |                      |           |           |             |            |            |          | FT.        | IN.    | FT. | IN.   | FT. | IN. | FT. | IN. | FT. | IN. | FT. | IN. | FT.            | IN. | FT.           | IN. | FT.    |
|                           |           | **WINGS**            |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
| 6                         | 4F        | DOWNSTREAM WEST WING |           | 20        |             |            | V          |          | 6          | 1.080  |     |       |     |     |     |     |     | 6   | 1.1 | 6   | 1.1            | 67  |               |     |        |
|                           |           | INCR = 51.60 IN      |           |           |             |            |            |          | 27         | 6.600  |     |       |     |     |     |     |     | 27  | 6.6 | 27  | 6.6            |     |               |     |        |
| 6                         | 4F        | DOWNSTREAM EAST WING |           | 20        |             |            | V          |          | 6          | 1.080  |     |       |     |     |     |     |     | 6   | 1.1 | 6   | 1.1            | 67  |               |     |        |
|                           |           | INCR = 51.60 IN      |           |           |             |            |            |          | 27         | 6.600  |     |       |     |     |     |     |     | 27  | 6.6 | 27  | 6.6            |     |               |     |        |
| 6                         | 4F        | UPSTREAM WEST WING   |           | 20        |             |            | V          |          | 6          | 4.800  |     |       |     |     |     |     |     | 6   | 4.8 | 6   | 4.8            | 68  |               |     |        |
|                           |           | INCR = 50.88 IN      |           |           |             |            |            |          | 27         | 7.320  |     |       |     |     |     |     |     | 27  | 7.3 | 27  | 7.3            |     |               |     |        |
| 6                         | 4F        | UPSTREAM EAST WING   |           | 20        |             |            | V          |          | 6          | 4.800  |     |       |     |     |     |     |     | 6   | 4.8 | 6   | 4.8            | 68  |               |     |        |
|                           |           | INCR = 50.88 IN      |           |           |             |            |            |          | 27         | 7.320  |     |       |     |     |     |     |     | 27  | 7.3 | 27  | 7.3            |     |               |     |        |
| 31                        | 5G        | DOWNSTREAM WEST WING |           | 20        |             |            | V          |          | 0          | 7.200  |     |       |     |     |     |     |     | 0   | 7.2 | 0   | 7.2            | 151 |               |     |        |
|                           |           | INCR = 3.36 IN       |           |           |             |            |            |          | 8          | 9.000  |     |       |     |     |     |     |     | 8   | 9   | 8   | 9              |     |               |     |        |
| 31                        | 5G        | DOWNSTREAM EAST WING |           | 20        |             |            | V          |          | 0          | 7.200  |     |       |     |     |     |     |     | 0   | 7.2 | 0   | 7.2            | 151 |               |     |        |
|                           |           | INCR = 3.36 IN       |           |           |             |            |            |          | 8          | 9.000  |     |       |     |     |     |     |     | 8   | 9   | 8   | 9              |     |               |     |        |
| 31                        | 5G        | UPSTREAM WEST WING   |           | 20        |             |            | V          |          | 0          | 7.200  |     |       |     |     |     |     |     | 0   | 7.2 | 0   | 7.2            | 153 |               |     |        |
|                           |           | INCR = 3.24 IN       |           |           |             |            |            |          | 8          | 10.200 |     |       |     |     |     |     |     | 8   | 10  | 8   | 10             |     |               |     |        |
| 31                        | 5G        | UPSTREAM EAST WING   |           | 20        |             |            | V          |          | 0          | 7.200  |     |       |     |     |     |     |     | 0   | 7.2 | 0   | 7.2            | 153 |               |     |        |
|                           |           | INCR = 3.24 IN       |           |           |             |            |            |          | 8          | 10.200 |     |       |     |     |     |     |     | 8   | 10  | 8   | 10             |     |               |     |        |
| 8                         | 7J6       | DOWNSTREAM WINGS     |           | 20        |             |            |            |          | 31         | 8.000  |     |       |     |     |     |     |     | 31  | 8   | 31  | 8              | 518 |               |     |        |
| 8                         | 7J6       | UPSTREAM WINGS       |           | 20        |             |            |            |          | 31         | 8.000  |     |       |     |     |     |     |     | 31  | 8   | 31  | 8              | 518 |               |     |        |
|                           | 6J5       | UPSTREAM WEST WING   |           | 19        |             |            | V          |          | 1          | 7.125  | 1   | 7.500 |     |     |     |     |     | 3   | 2.6 | 3   | 2.6            | 0   |               |     |        |
|                           |           | INCR = 18.375 IN     |           |           |             |            |            |          | 2          | 0.750  | 5   | 9.000 |     |     |     |     |     | 7   | 9.8 | 7   | 9.8            |     |               |     |        |
|                           | 6J5       | UPSTREAM EAST WING   |           | 19        |             |            | V          |          | 2          | 0.625  | 6   | 4.400 |     |     |     |     |     | 8   | 5   | 8   | 5              | 0   |               |     |        |
|                           |           | INCR = 1.875 IN      |           |           |             |            |            |          | 10         | 2.125  | 6   | 4.400 |     |     |     |     |     | 16  | 6.5 | 16  | 6.5            |     |               |     |        |
|                           | 6J5       | DOWNSTREAM WEST WING |           | 19        |             |            | V          |          |            |        |     |       |     |     |     |     |     | 0   | 0   | 0   | 0              | 0   |               |     |        |
|                           |           | INCR = 2.000 IN      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     | 0   | 0   | 0   | 0              |     |               |     |        |
|                           | 6J5       | DOWNSTREAM EAST WING |           | 19        |             |            | V          |          |            |        |     |       |     |     |     |     |     | 0   | 0   | 0   | 0              | 0   |               |     |        |
|                           |           | INCR = 18.375 IN     |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     | 0   | 0   | 0   | 0              |     |               |     |        |
|                           | 6J5       | UPSTREAM WEST WING   |           | 19        |             |            | V          |          |            |        |     |       |     |     |     |     |     | 0   | 0   | 0   | 0              | 0   |               |     |        |
|                           |           | INCR = 1.875 IN      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     | 0   | 0   | 0   | 0              |     |               |     |        |
|                           | 6J5       | DOWNSTREAM EAST WING |           | 19        |             |            | V          |          |            |        |     |       |     |     |     |     |     | 0   | 0   | 0   | 0              | 0   |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |
|                           |           |                      |           |           |             |            |            |          |            |        |     |       |     |     |     |     |     |     |     |     |                |     |               |     |        |



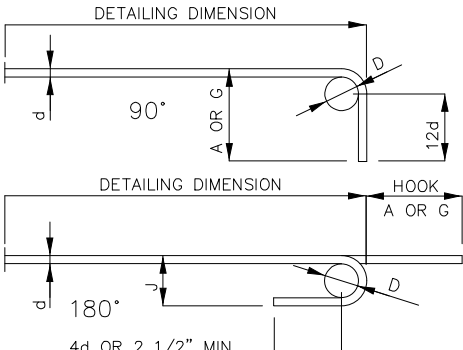
| SPLICE LENGTH |           | MAX BAR LENGTH |           |
|---------------|-----------|----------------|-----------|
| BAR SIZE      | NON-EPOXY | BAR SIZE       | NON-EPOXY |
| #4            | 21 IN.    | #4             | 60 FT.    |
| #5            | 26 IN.    | #5             | 60 FT.    |
| #6            | 31 IN.    | #6             | 60 FT.    |
| #7            | 39 IN.    | #7             | 60 FT.    |
| #8            | 51 IN.    | #8             | 60 FT.    |
| #9            | 65 IN.    | #9             | 60 FT.    |
| #10           | 82 IN.    | #10            | 60 FT.    |
| #11           | 101 IN.   | #11            | 60 FT.    |

NOTE:  
THE BAR LIST IS BASED ON THE MISSOURI  
STANDARD PLANS.  
THIS BAR LIST IS FOR QUANTITY  
ESTIMATION PURPOSE ONLY AND SHALL BE  
VERIFIED OR MODIFIED BY THE CONTRACTOR.



| STIRRUP HOOK DIMENSIONS |         |             |             |             |           |  |
|-------------------------|---------|-------------|-------------|-------------|-----------|--|
| BAR SIZE                | D (IN.) | 90° HOOK    |             | 135° HOOK   |           |  |
|                         |         | HOOK A OR G | HOOK A OR G | HOOK A OR G | APPROX. H |  |
| #4                      | 2"      | 4 1/2"      | 4 1/2"      | 3"          |           |  |
| #5                      | 2 1/2"  | 6"          | 5 1/2"      | 3 3/4"      |           |  |
| #6                      | 4 1/2"  | 12"         | 8"          | 4 1/2"      |           |  |

NOTE: UNLESS OTHERWISE NOTED, DIAMETER "D" IS THE SAME FOR ALL BENDS AND HOOKS ON A BAR.



| END HOOK DIMENSIONS |            |            |         |           |
|---------------------|------------|------------|---------|-----------|
| BAR<br>SIZE         | D<br>(IN.) | GRADE 60   |         |           |
|                     |            | 180° HOOKS |         | 90° HOOKS |
|                     |            | A OR G     | J       | A OR G    |
| #4                  | 3"         | 6"         | 4"      | 5"        |
| #5                  | 3 3/4"     | 7"         | 5"      | 8"        |
| #6                  | 4 1/2"     | 8"         | 6"      | 12"       |
| #7                  | 5 1/4"     | 10"        | 7"      | 14"       |
| #8                  | 6"         | 11"        | 8"      | 16"       |
| #9                  | 9 1/2"     | 15"        | 11 3/4" | 19"       |
| #10                 | 10 3/4"    | 17"        | 13 1/4" | 22"       |
| #11                 | 12"        | 19"        | 14 3/4" | 24"       |

NOTE: ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEGREE ARE TO BE BENT WITH SAME  
PITCH AS FOR 90 DEGREE STANDARD HOOKS.  
ALL HOOKS AND BENDS TO BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.  
FB = BARS MAY BE BENT IN FIELD TO FIT.  
S = STIRRUP  
V = BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE  
AND THE FOLLOWING LINE. A BLANK IN THE FOLLOWING LINE REPRESENTS THE SAME BAR DIMENSION AS THAT  
ON THE FIRST LINE. IT IS AN INDICATION OF CONTINUITY TO ADD A SUFFICE LENGTH TO A BAR  
LENGTH WITHIN ITS MAXIMUM ALLOWABLE LENGTH.  
NO. EA. = NUMBER OF BARS OF EACH LENGTH  
DIMENSIONS SHOWN IN BENDING DIAGRAMS AND IN LISTED  
FOR FABRICATORS USE. (NEAREST INCH)  
ALL DIMENSIONS MEASURED ALONG CENTERLINE BAR TO THE NEAREST INCH.  
PAYMENTS ARE BASED ON ACTUAL LENGTHS.  
REINFORCING STEEL (GRADE 60) FY = 60,000 PSI.



Diagram of Shape 10: A U-shaped profile. The height of the vertical legs is labeled  $C$ , and the width of the base is labeled  $D$ .

SHAPE 19



SHAPE 20

SHAPE 27

| NO REQD. | MARK NO.     | LOCATION            | EPOXY (E) | SHAPE NO. | STIRRUP (S) | SUBSTR (X) | VARIES (V) | NO. EACH | DIMENSIONS |        |     |        |     |        |     |                               | NOMINAL LENGTH               | ACTUAL LENGTH | WEIGHT |       |      |     |     |     |     |
|----------|--------------|---------------------|-----------|-----------|-------------|------------|------------|----------|------------|--------|-----|--------|-----|--------|-----|-------------------------------|------------------------------|---------------|--------|-------|------|-----|-----|-----|-----|
|          | SIZE MARK    |                     |           |           |             |            |            |          | B          |        | C   |        | D   |        | E   |                               |                              |               |        | F     |      | H   |     | K   |     |
|          |              |                     |           |           |             |            |            |          | FT.        | IN.    | FT. | IN.    | FT. | IN.    | FT. | IN.                           |                              |               |        | FT.   | IN.  | FT. | IN. | FT. | IN. |
|          |              | *BARREL SECTION**   |           |           |             |            |            |          |            |        |     |        |     |        |     |                               |                              |               |        |       |      |     |     |     |     |
|          |              |                     |           |           |             |            |            |          |            |        |     |        |     |        |     |                               |                              |               |        |       |      |     |     |     |     |
| 180      | 4A1          | TOP SLAB            |           | 20        |             |            |            |          | 26         | 4.000  |     |        |     |        |     |                               | 26                           | 4             | 26     | 4     | 3166 |     |     |     |     |
| 127      | 5A2          | BOTTOM SLAB         |           | 20        |             |            |            |          | 26         | 4.000  |     |        |     |        |     |                               | 26                           | 4             | 26     | 4     | 3488 |     |     |     |     |
| 359      | 5B1          | INTERIOR WALLS      |           | 10        |             |            |            |          |            |        | 1   |        | 8   | 10.920 |     |                               | 9                            | 10.9          | 9      | 10.9  | 3711 |     |     |     |     |
| 180      | 5B2          | EXTERIOR WALLS      |           | 10        |             |            |            |          |            |        | 1   |        | 8   | 10.920 |     |                               | 9                            | 10.9          | 9      | 10.9  | 1861 |     |     |     |     |
| 288      | 6J3          | EXTERIOR WALLS      |           | 19        |             |            |            |          | 2          | 8.000  | 3   | 11.750 |     |        |     |                               | 6                            | 7.75          | 6      | 7.75  | 2875 |     |     |     |     |
| 336      | 6J4          | EXTERIOR WALLS      |           | 19        |             |            |            |          | 8          | 4.000  | 4   | 7.000  |     |        |     |                               | 12                           | 11            | 12     | 11    | 6519 |     |     |     |     |
| 135      | 5H1          | TOP SLAB            |           | 20        |             |            |            |          | 12         | 3.480  |     |        |     |        |     |                               | 12                           | 3.48          | 12     | 3.48  | 1730 |     |     |     |     |
|          | 5H2          | TOP SLAB            |           | 20        |             |            |            |          | 4          | 7.000  |     |        |     |        |     |                               | 4                            | 7             | 4      | 7     | 645  |     |     |     |     |
| 168      | 5H3          | BOTTOM SLAB         |           | 20        |             |            |            |          | 6          | 6.000  |     |        |     |        |     |                               | 6                            | 6             | 6      | 6     | 1139 |     |     |     |     |
| 37       | 4F           | TOP SLAB            |           | 20        |             |            |            |          | 89         | 8.000  |     |        |     |        |     |                               | 89                           | 8             | 89     | 8     | 2216 |     |     |     |     |
| 33       | 4F           | BOTTOM SLAB         |           | 20        |             |            |            |          | 89         | 8.000  |     |        |     |        |     |                               | 89                           | 8             | 89     | 8     | 1977 |     |     |     |     |
| 36       | 4F           | INTERIOR WALLS      |           | 20        |             |            |            |          | 89         | 8.000  |     |        |     |        |     |                               | 89                           | 8             | 89     | 8     | 2156 |     |     |     |     |
| 4        | 4F           | EXTERIOR WALLS      |           | 20        |             |            |            |          | 89         | 8.000  |     |        |     |        |     |                               | 89                           | 8             | 89     | 8     | 240  |     |     |     |     |
|          |              |                     |           |           |             |            |            |          |            |        |     |        |     |        |     | TOTAL BARREL SECTION = 31,723 |                              |               |        |       |      |     |     |     |     |
|          | **HEADWALL** |                     |           |           |             |            |            |          |            |        |     |        |     |        |     |                               |                              |               |        |       |      |     |     |     |     |
|          |              |                     |           |           |             |            |            |          |            |        |     |        |     |        |     |                               |                              |               |        |       |      |     |     |     |     |
| 4        | 8D1          | HEADWALL            |           | 20        |             |            |            |          | 26         | 4.000  |     |        |     |        |     |                               | 26                           | 4             | 26     | 4     | 281  |     |     |     |     |
| 27       | 5R1          | UPSTREAM HEADWALL   |           | 27        |             |            |            |          | 0          | 16.000 | 0   | 22.000 |     | 2      |     |                               | 0                            | 5.000         | 0      | 5.000 | 6    | 0   | 6   | 0   | 169 |
| 27       | 5R2          | UPSTREAM HEADWALL   |           | 10        |             |            |            |          |            |        | 0   | 10.000 | 0   | 22.000 |     |                               |                              |               |        |       | 2    | 8   | 2   | 8   | 75  |
| 27       | 5R3          | DOWNSTREAM HEADWALL |           | 10        |             |            |            |          |            |        | 0   | 16.000 | 0   | 22.000 |     |                               |                              |               |        |       | 3    | 2   | 3   | 2   | 89  |
|          |              |                     |           |           |             |            |            |          |            |        |     |        |     |        |     |                               | TOTAL HEADWALL SECTION = 614 |               |        |       |      |     |     |     |     |

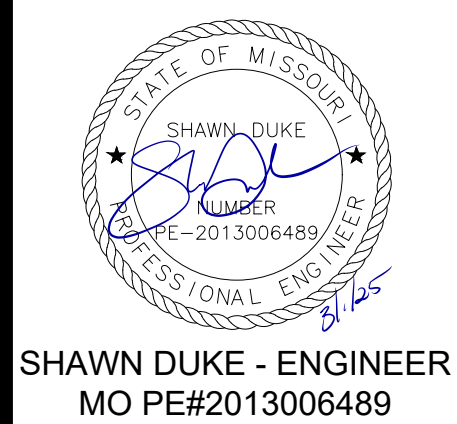
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| MARK        | REVISION | DATE             | BY                |
|-------------|----------|------------------|-------------------|
| Engineer:   | SD       | Checked By: SD   | Scale: 1" = 20'   |
| Technician: | BT       | Date: 04-15-2022 | T-R-S: 47N-32W-24 |

**Sheet C5.7**

Snyder & Associates Engineers & Planners, Inc.  
Missouri State Certificate of Authority #20160108544



**WHISPERING WOODS CREEK RESTORATION**

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**BOX CULVERT DETAILS**

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**LEE'S SUMMIT, MO**



Project No: 120.0485.11  
Sheet C5.7