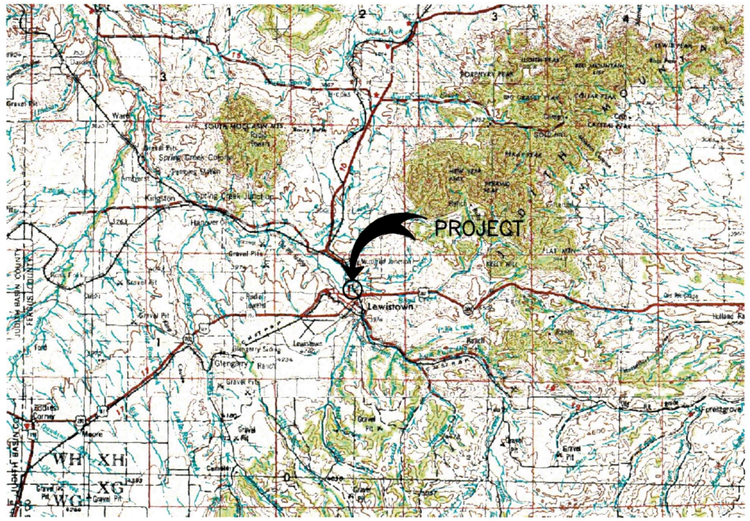
# PLANS FOR THE CONSTRUCTION OF THE BIG SPRING CREEK RESTORATION PROJECT for MACHLER, ADAMS and MT FISH, WILDLIFE & PARKS MT FWP PROJECT # 15–31 in FERGUS COUNTY MONTANA

PREPARED BY

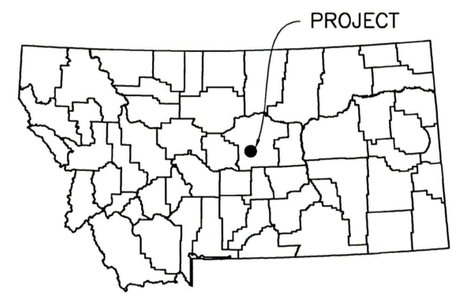
USDA United States Department of Agriculture
Natural Resources Conservation Service




PROJECT LOCATION MAP

N 1/2, SW 1/4 Section 10 T15N R18E

7 0 7 14
Scale in Miles




MONTANA – FERGUS COUNTY

MONTANA
STEPHAN M. BECKER
No. 18246PE
LICENSED PROFESSIONAL ENGINEER

Stephan Becker 7/30/15
Signature Date

## INDEX OF DRAWINGS


| SHT. NO. | TITLE |
|---|---|
| 1. | INDEX OF DRAWINGS |
| 2. | SURVEY REFERENCE MAP |
| 3. | PROJECT OVERVIEW |
| 4. | PLAN VIEW INDEX |
| 5. | PLAN & PROFILE STA. 99+60–105+60 |
| 6. | PLAN & PROFILE STA. 105+60–112+80 |
| 7. | PLAN & PROFILE STA. 112+80–119+40 |
| 8. | PLAN & PROFILE STA. 119+40–124+80 |
| 9. | PLAN & PROFILE STA. 124+80–128+40 |
| 10. | PLAN & PROFILE STA. 128+40–135+00 |
| 11. | TYPICAL CHANNEL XSECTIONS |
| 12. | BANK PROTECTION DETAILS – TYPE I |
| 13. | BANK PROTECTION DETAILS – TYPE II |
| 14. | BANK PROTECTION DETAILS – TYPE III |
| 15. | BANK PROTECTION DETAILS – TYPE IV |
| 16. | BANK PROTECTION DETAILS – RIFFLE |
| 17. | BED STABILIZATION IN–STREAM STRUCTURE DETAILS |
| 18. | OLD CHANNEL DETAILS |
| 19. | PLAN & PROFILE BREED CREEK |
| 20. | BREED CREEK ROCK CHUTE DETAILS |
| 21. | CONSTRUCTION WORK LIMITS |


## GENERAL NOTES

1. *The project installer is responsible for the notification of all utility companies affected by this project. The project installer is responsible for determining the exact physical locations of all utilities affected by this project.*

2. *Survey work for the project was completed with Survey Grade GPS with the following settings: UTM Zone 12, NAD83 (CONUS MOL), Geoid Model 03, International Feet for Horizontal Coordinates and U. S. Survey Feet for Vertical Datum. Elevations were adjusted to NGVD29 based on surveyed NGS First Order Vertical Benchmarks (PID SR0347 – Designation L 195 & PIP SR0348 – Designation J 195).*

3. *Survey reference stakes have been placed by NRCS in the field. It is the responsibility of the Contractor to protect Rebar #1, Rebar #3 and Rebar #4 from damage during construction.*

4. *These plans are intended to express the minimum requirements for the Stream Restoration Project. Any changes from the details shown in these plans will have the concurrence of MT FWP, the Landowner, and the NRCS Engineer prior to installation. Refer to the Special Provisions for additional requirements.*

NRCS Job Classification V

| | | Date |
|---|---|---|
| Designed | K Hoffman | 7/2015 |
| Drawn | B Krueger | 7/2015 |
| Checked | S Becker | 7/2015 |
| Approved | | |

INDEX OF DRAWINGS
BIG SPRING CREEK RESTORATION PROJECT
MACHLER, ADAMS And MT FISH WILDLIFE & PARKS
FERGUS COUNTY MONTANA

USDA United States Department of Agriculture
Natural Resources Conservation Service

File No. BigSpCr_Cover.dwg
Drawing No. 15–31
7/30/15 9:17 AM
Sheet 1 of 21

N

N 1/2, SW 1/4 Section 10 T15N R18E

– Survey Reference Point

| Control Points | | | |
|---|---|---|---|
| Description | Northing | Easting | Elevation |
| Hub 1 | 17108635.67 | 2030717.97 | 3890.21 |
| Hub 2 | 17108651.85 | 2030287.69 | 3887.70 |
| Hub 3 | 17108549.03 | 2029755.52 | 3886.14 |
| Hub 4 | 17108507.90 | 2031458.87 | 3894.49 |
| Hub 5 | 17108475.72 | 2031251.87 | 3892.97 |
| Hub 6 | 17108516.33 | 2031118.24 | 3890.68 |
| Hub 10 | 17108546.25 | 2029929.51 | 3885.81 |
| Hub 11 | 17108565.30 | 2030074.34 | 3887.02 |
| Rebar 1–1 | 17108685.60 | 2031680.24 | 3899.94 |
| Rebar 2 | 17108535.12 | 2031685.17 | 3901.25 |
| Rebar 3 | 17109031.18 | 2031329.34 | 3894.12 |
| Rebar 4 | 17108447.73 | 2029651.76 | 3885.00 |
| Rebar 7 | 17109109.14 | 2030971.23 | 3896.35 |
| Rebar 8 | 17108271.41 | 2029656.99 | 3884.31 |
| Rebar 15 | 17109012.31 | 2030319.07 | 3889.56 |

NOTE: Survey work for the project was completed with Survey Grade GPS with the following settings: UTM Zone 12, NAD83 (CONUS MOL), Geoid Model 03, International Feet for both Vertical and Horizontal Datums. Elevations were adjusted to NGVD29 based on surveyed NGS First Order Vertical Benchmarks (PID SR0347 – Designation L 195 & Pid SR0348 – Designation J 195).

SURVEY REFERENCE MAP

200 0 100 200
Scale in Feet

| | | Date |
|---|---|---|
| Designed | K Hoffman | 7/2015 |
| Drawn | B Krueger | 7/2015 |
| Checked | S Becker | 7/2015 |
| Approved | | |

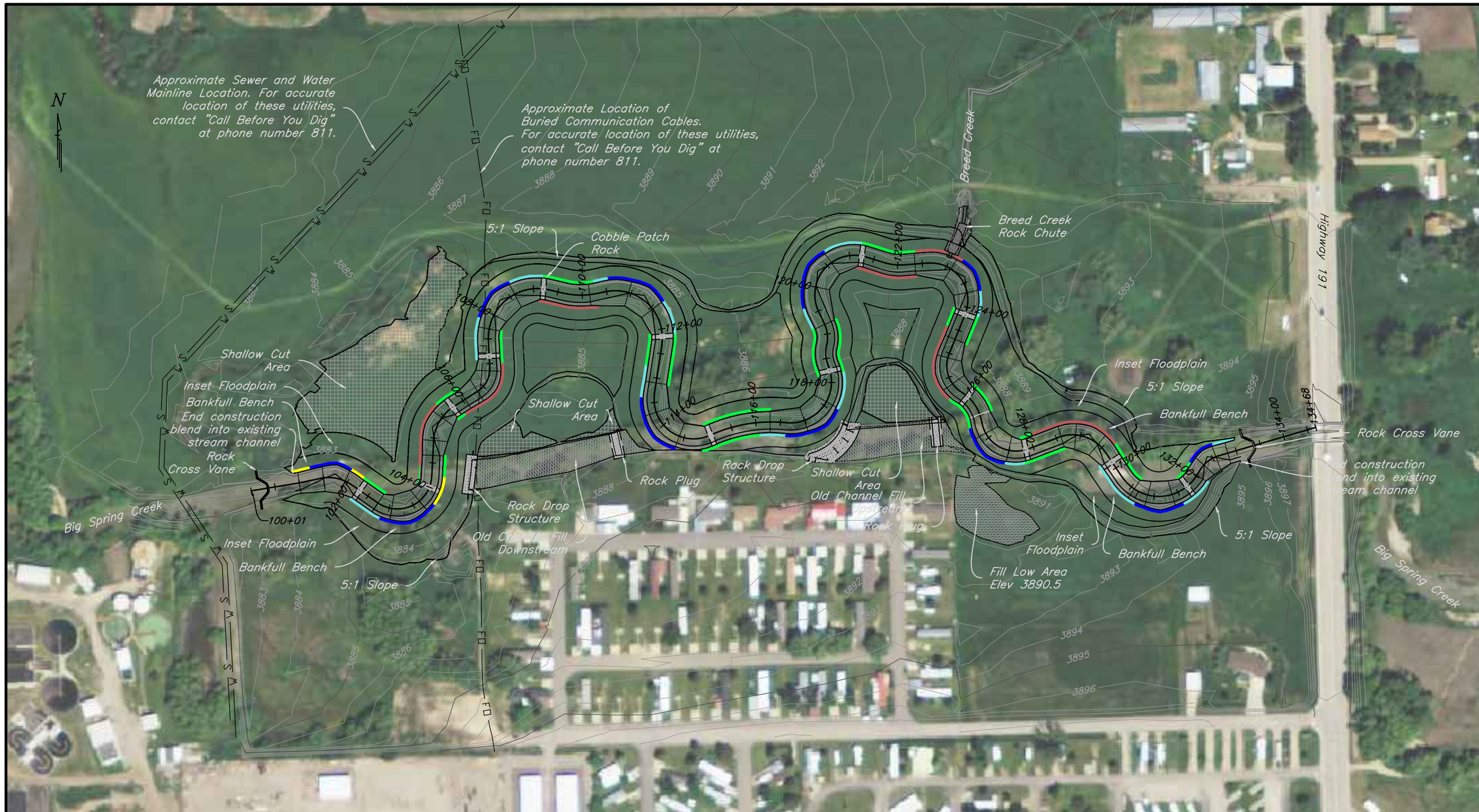
SURVEY REFERENCE MAP
BIG SPRING CREEK RESTORATION PROJECT
MACHLER, ADAMS And MT FISH WILDLIFE & PARKS
FERGUS COUNTY MONTANA

United States Department of Agriculture
Natural Resources Conservation Service

File No. BigSpCr_Sur.dwg

Drawing No. 15–31

7/30/15 9:18 AM
Sheet 2 of 21




PLAN VIEW

| PROPOSED CHANNEL CHARACTERISTICS | |
|---|---|
| Drainage Area: | 185.5 sq mi |
| Bankfull Flow: | 460 cfs |
| Slope: | 0.0019 ft/ft |
| Sinuosity: | 2.0 |
| Bankfull Width: | 43.1 ft |
| Bankfull Mean Depth: | 3.2 ft |
| Stream Type: | C4 |
| Valley Type: | VIII |

100 0 100 200
Scale in Feet

Note:

For accurate location of all utilities, contact "Call Before You Dig" at phone number 811.

BANK PROTECTION LEGEND

- Type I Bank Protection
- Type II Bank Protection
- Type III Bank Protection
- Type IV Bank Protection
- Riffle Bank Protection

LEGEND

- W — Water Line
- S — Sewer Line
- FO — Fiber Optic Line
- 3568 — Contour Line
- Rock Cross Vane
- Permanent Rock Plug
- Shallow Cut Areas
- Fill Areas

| | | Date |
|---|---|---|
| Designed | K Hoffman | 7/2015 |
| Drawn | B Krueger | 7/2015 |
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| Approved | | |

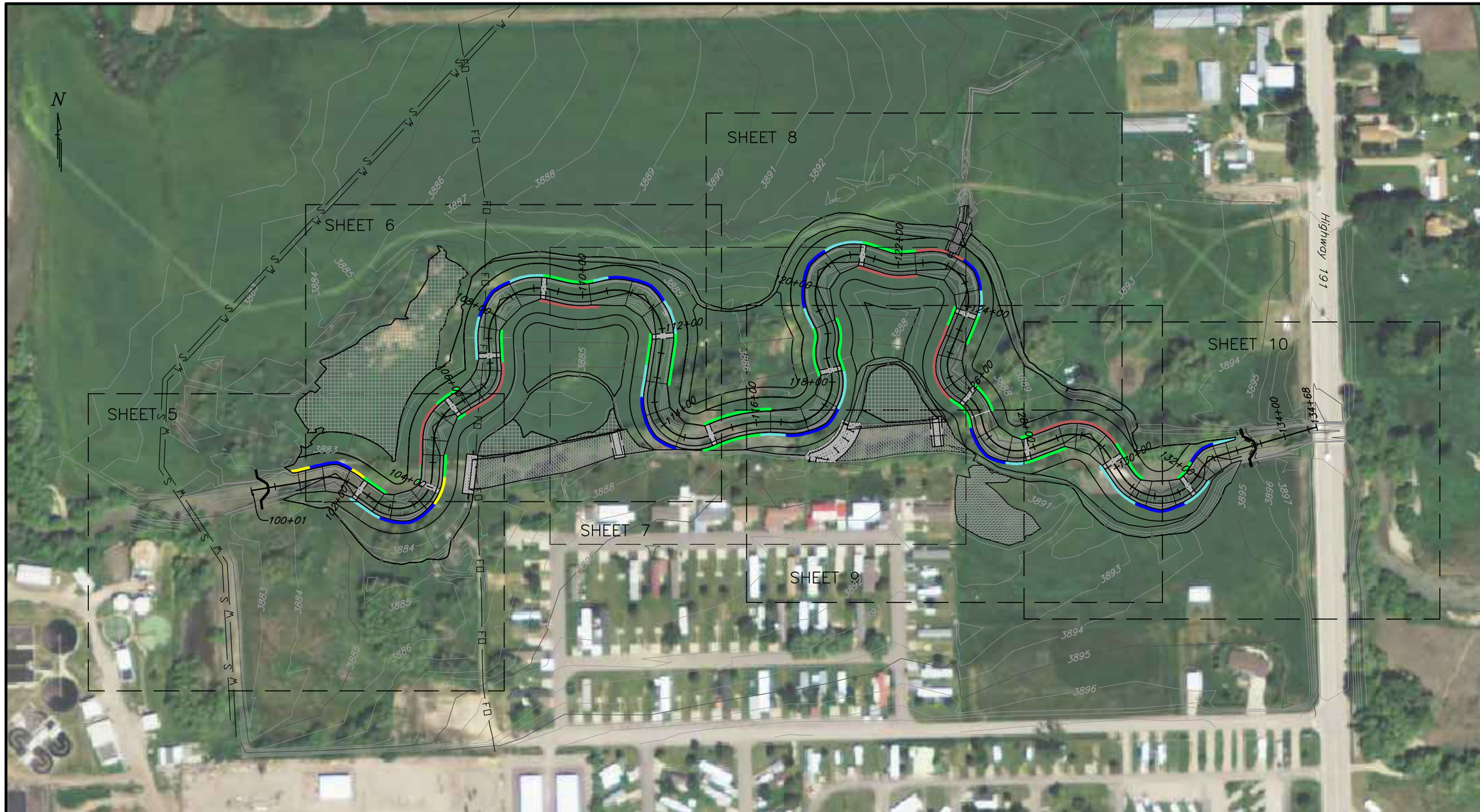
PROJECT OVERVIEW
BIG SPRING CREEK RESTORATION PROJECT
MACHLER, ADAMS And MT FISH WILDLIFE & PARKS
FERGUS COUNTY MONTANA

United States Department of Agriculture
Natural Resources Conservation Service

File No. BigSpPlanPro.dwg

Drawing No. 15-31

7/30/15 10:18 AM
Sheet 3 of 21




BANK PROTECTION LEGEND

- Type I Bank Protection
- Type II Bank Protection
- Type III Bank Protection
- Type IV Bank Protection
- Riffle Bank Protection

100 0 100 200
Scale in Feet

LEGEND

- W — Water Line
- S — Sewer Line
- FO — Fiber Optic Line
- 3568 — Contour Line
- Rock Cross Vane
- Permanent Rock Plug
- Shallow Cut Areas
- Fill Areas

PLAN VIEW



| | | Date |
|---|---|---|
| Designed | K Hoffman | 7/2015 |
| Drawn | B Krueger | 7/2015 |
| Checked | S Becker | 7/2015 |
| Approved | | |

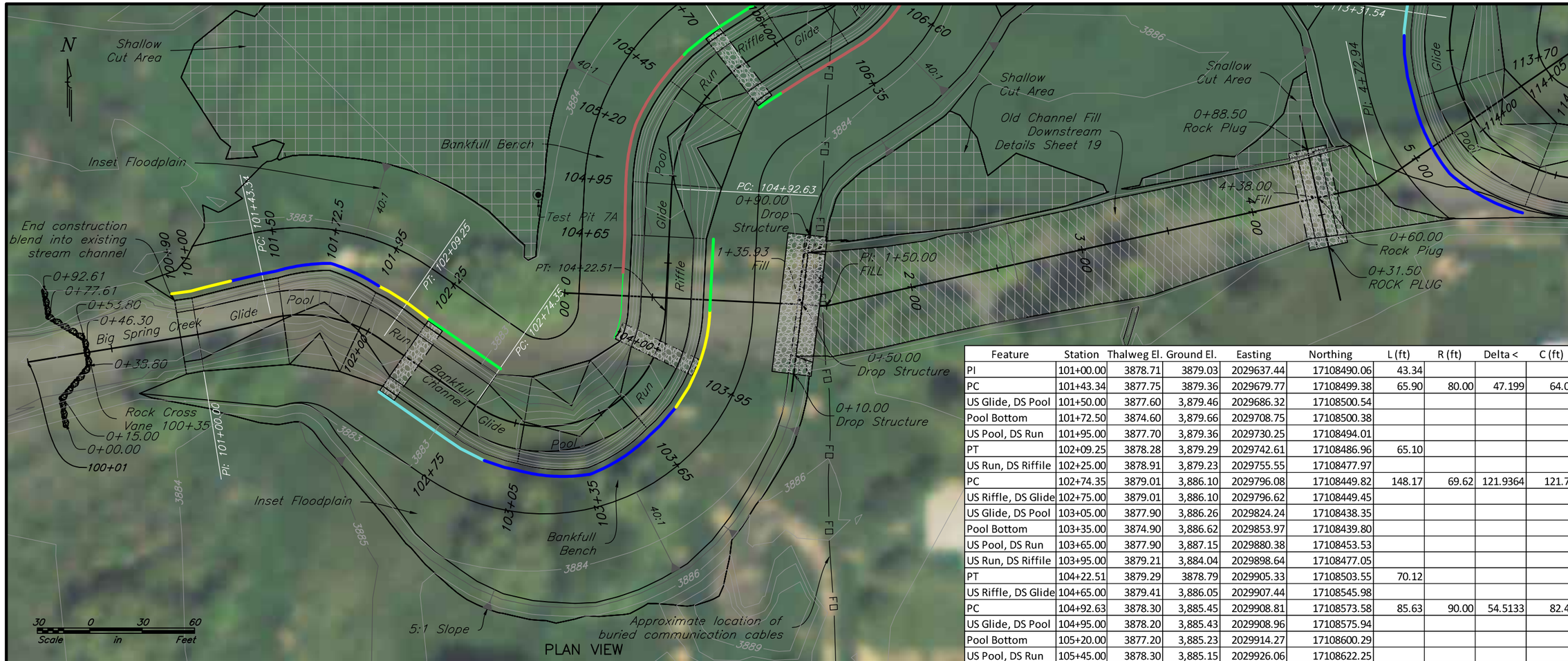
PLAN VIEW INDEX
BIG SPRING CREEK RESTORATION PROJECT
MACHLER, ADAMS And MT FISH WILDLIFE & PARKS
FERGUS COUNTY MONTANA

United States Department of Agriculture
Natural Resources Conservation Service

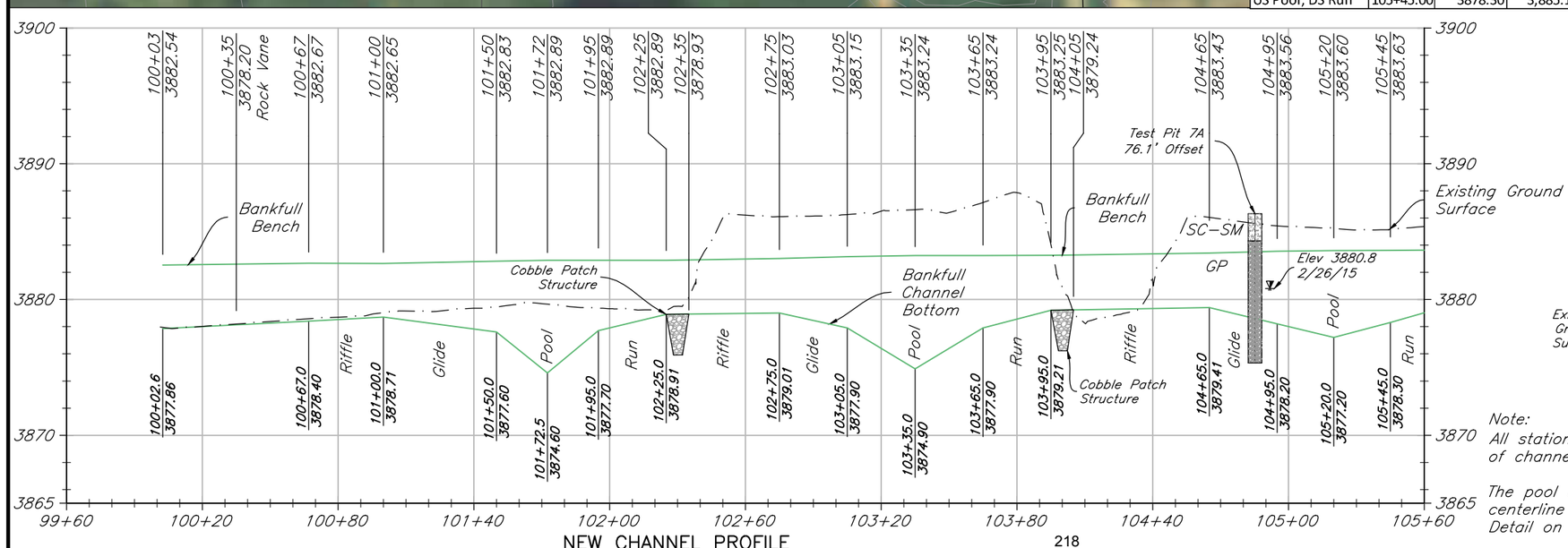
File No. BigSpPlanPro.dwg

Drawing No. 15-31

7/30/15 10:18 AM
Sheet 4 of 21



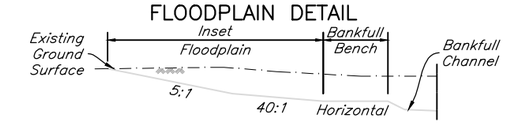

| Feature | Station | Thalweg El. | Ground El. | Easting | Northing | L (ft) | R (ft) | Delta < | C (ft) |
|---|---|---|---|---|---|---|---|---|---|
| PI | 101+00.00 | 3878.71 | 3879.03 | 2029637.44 | 17108490.06 | 43.34 | | | |
| PC | 101+43.34 | 3877.75 | 3879.36 | 2029679.77 | 17108499.38 | 65.90 | 80.00 | 47.199 | 64.06 |
| US Glide, DS Pool | 101+50.00 | 3877.60 | 3,879.46 | 2029686.32 | 17108500.54 | | | | |
| Pool Bottom | 101+72.50 | 3874.60 | 3,879.66 | 2029708.75 | 17108500.38 | | | | |
| US Pool, DS Run | 101+95.00 | 3877.70 | 3,879.36 | 2029730.25 | 17108494.01 | | | | |
| PT | 102+09.25 | 3878.28 | 3,879.29 | 2029742.61 | 17108486.96 | 65.10 | | | |
| US Run, DS Riffile | 102+25.00 | 3878.91 | 3,879.23 | 2029755.55 | 17108477.97 | | | | |
| PC | 102+74.35 | 3879.01 | 3,886.10 | 2029796.08 | 17108449.82 | 148.17 | 69.62 | 121.9364 | 121.75 |
| US Riffle, DS Glide | 102+75.00 | 3879.01 | 3,886.10 | 2029796.62 | 17108449.45 | | | | |
| US Glide, DS Pool | 103+05.00 | 3877.90 | 3,886.26 | 2029824.24 | 17108438.35 | | | | |
| Pool Bottom | 103+35.00 | 3874.90 | 3,886.62 | 2029853.97 | 17108439.80 | | | | |
| US Pool, DS Run | 103+65.00 | 3877.90 | 3,887.15 | 2029880.38 | 17108453.53 | | | | |
| US Run, DS Riffile | 103+95.00 | 3879.21 | 3,884.04 | 2029898.64 | 17108477.05 | | | | |
| PT | 104+22.51 | 3879.29 | 3878.79 | 2029905.33 | 17108503.55 | 70.12 | | | |
| US Riffle, DS Glide | 104+65.00 | 3879.41 | 3,886.05 | 2029907.44 | 17108545.98 | | | | |
| PC | 104+92.63 | 3878.30 | 3,885.45 | 2029908.81 | 17108573.58 | 85.63 | 90.00 | 54.5133 | 82.44 |
| US Glide, DS Pool | 104+95.00 | 3878.20 | 3,885.43 | 2029908.96 | 17108575.94 | | | | |
| Pool Bottom | 105+20.00 | 3877.20 | 3,885.23 | 2029914.27 | 17108600.29 | | | | |
| US Pool, DS Run | 105+45.00 | 3878.30 | 3,885.15 | 2029926.06 | 17108622.25 | | | | |




## CHANNEL LAYOUT CHART

"PC" = Point of Curvature
"PT" = Point of Tangency
"PCC" = Point of Compound Curvature
"PRC" = Point of Reverse Curvature
"L" = Curve Length
"Delta <" = Angle at Curve Center Point (PC to PT)
"R" = Curve Radius
"C" = Chord Length
"O" = Curve Center Point

## FLOODPLAIN DETAIL




Note:
All stationing is located along ℄ of channel.

The pool thalweg is offset from centerline of bankfull channel. Detail on Shee Sheet 11.

**BANK PROTECTION LEGEND**

- Type I Bank Protection
- Type II Bank Protection
- Type III Bank Protection
- Type IV Bank Protection
- Riffle Bank Protection

| | | Date |
|---|---|---|
| Designed | K Hoffman | 7/2015 |
| Drawn | B Krueger | 7/2015 |
| Checked | S Becker | 7/2015 |
| Approved | | |

# PLAN & PROFILE STA 99+60–105+60
## BIG SPRING CREEK RESTORATION PROJECT
MACHLER, ADAMS And MT FISH WILDLIFE & PARKS

FERGUS COUNTY MONTANA

United States Department of Agriculture
USDA
Natural Resources Conservation Service

File No. BigSpPlanPro.dwg

Drawing No. 15–31

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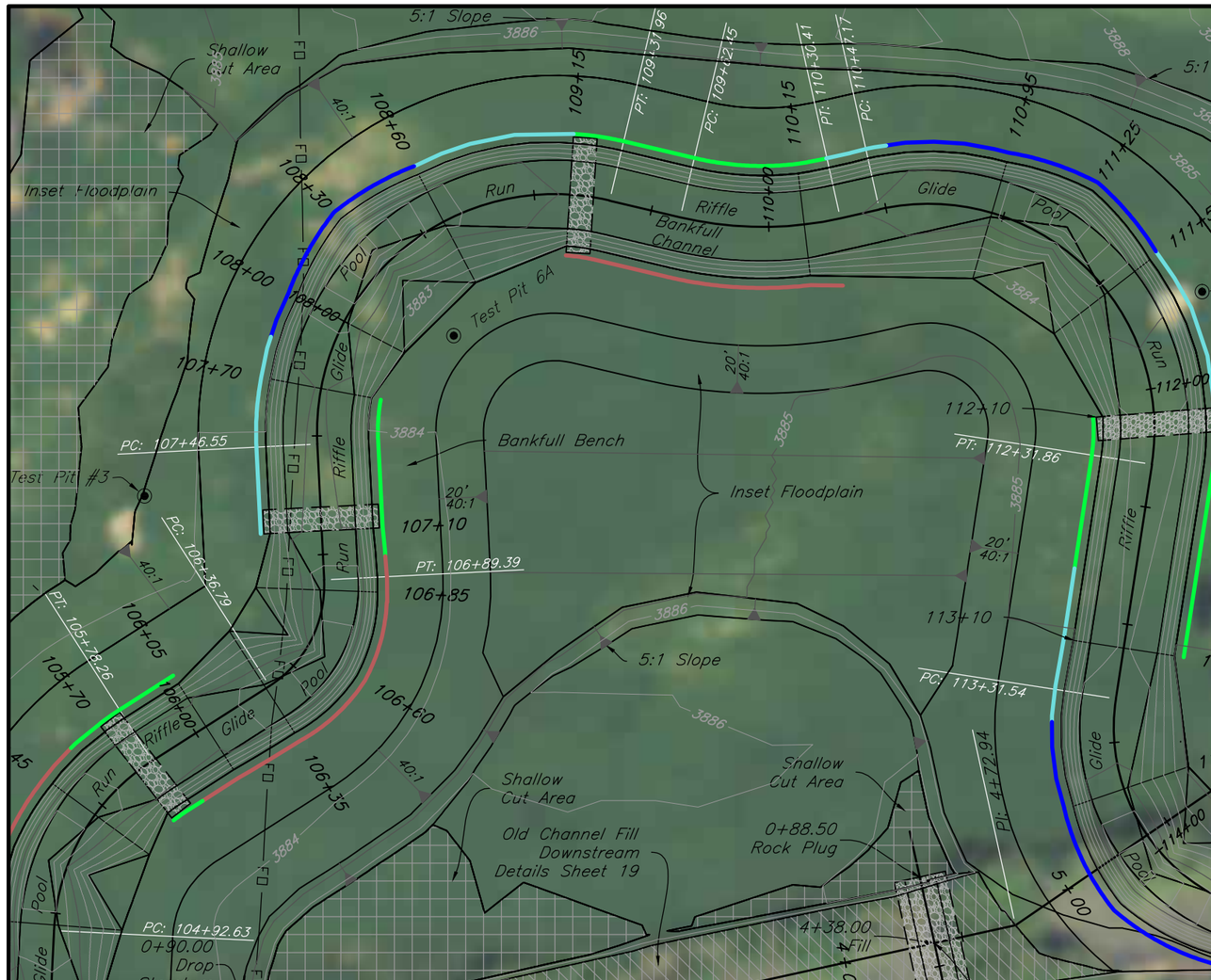
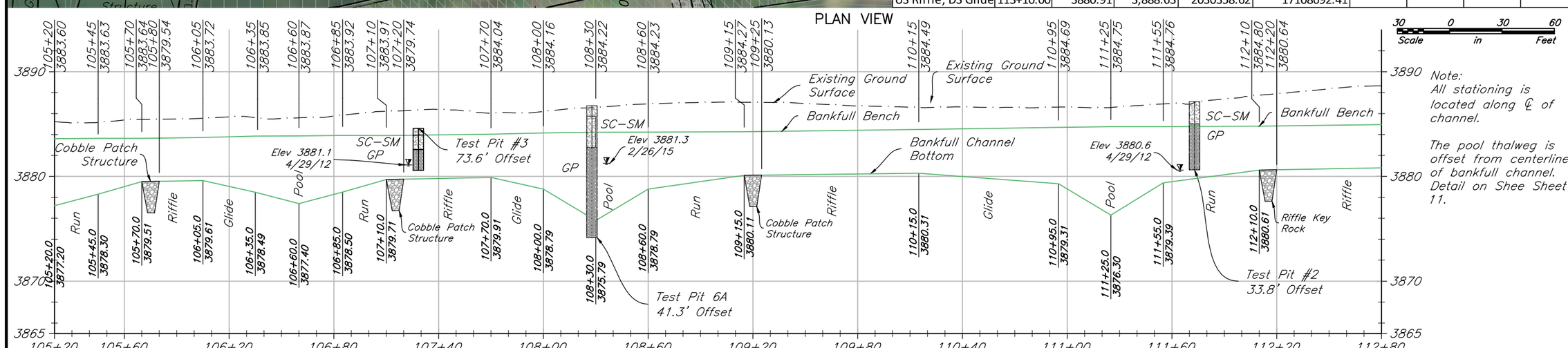
Sheet 5 of 21




| Feature | Station | Thalweg El. | Ground El. | Easting | Northing | L (ft) | R (ft) | Delta < | C (ft) |
|---|---|---|---|---|---|---|---|---|---|
| US Run, DS Riffile | 105+70.00 | 3879.51 | 3,885.45 | 2029943.42 | 17108640.13 | | | | |
| PT | 105+78.26 | 3879.53 | 3,885.46 | 2029950.15 | 17108644.89 | 58.54 | | | |
| US Riffle, DS Glide | 106+05.00 | 3879.61 | 3,885.56 | 2029972.67 | 17108659.32 | | | | |
| US Glide, DS Pool | 106+35.00 | 3878.49 | 3,885.61 | 2029997.94 | 17108675.50 | | | | |
| PC | 106+36.79 | 3878.42 | 3,885.57 | 2029999.45 | 17108676.47 | 52.59 | 50.00 | 60.2658 | 50.20 |
| Pool Bottom | 106+60.00 | 3877.40 | 3,885.60 | 2030015.44 | 17108692.99 | | | | |
| US Pool, DS Run | 106+85.00 | 3878.50 | 3,885.87 | 2030022.45 | 17108716.72 | | | | |
| PT | 106+89.39 | 3878.71 | 3,885.94 | 2030022.41 | 17108721.11 | 57.16 | | | |
| US Run, DS Riffle | 107+10.00 | 3879.71 | 3,886.21 | 2030021.37 | 17108741.69 | | | | |
| PC | 107+46.55 | 3879.83 | 3,886.36 | 2030019.52 | 17108778.19 | 185.41 | 100.00 | 106.2328 | 159.97 |
| US Riffle, DS Glide | 107+70.00 | 3879.91 | 3,886.04 | 2030021.07 | 17108801.54 | | | | |
| US Glide, DS Pool | 108+00.00 | 3878.79 | 3,886.20 | 2030030.87 | 17108829.78 | | | | |
| Pool Bottom | 108+30.00 | 3875.79 | 3,886.57 | 2030048.57 | 17108853.86 | | | | |
| US Pool, DS Run | 108+60.00 | 3878.79 | 3,886.92 | 2030072.59 | 17108871.64 | | | | |
| US Run, DS Riffle | 109+15.00 | 3880.11 | 3,887.09 | 2030125.69 | 17108883.06 | | | | |
| PT | 109+31.96 | 3880.14 | 3,887.07 | 2030142.44 | 17108880.57 | 30.49 | | | |
| PC | 109+62.45 | 3880.21 | 3,886.87 | 2030172.11 | 17108873.54 | 67.96 | 150.00 | 25.9578 | 67.38 |
| US Riffle, DS Glide | 110+15.00 | 3880.31 | 3,886.59 | 2030224.31 | 17108870.54 | | | | |
| PT | 110+30.41 | 3880.12 | 3,886.62 | 2030239.49 | 17108873.13 | 16.77 | | | |
| PC | 110+47.17 | 3879.91 | 3,886.62 | 2030255.85 | 17108876.80 | 184.68 | 95.00 | 111.3854 | 156.95 |
| US Glide, DS Pool | 110+95.00 | 3879.31 | 3,886.63 | 2030303.15 | 17108875.32 | | | | |
| Pool Bottom | 111+25.00 | 3876.30 | 3,886.59 | 2030330.17 | 17108862.57 | | | | |
| US Pool, DS Run | 111+55.00 | 3879.39 | 3,886.93 | 2030351.89 | 17108842.06 | | | | |
| US Run, DS Riffile | 112+10.00 | 3880.61 | 3,887.76 | 2030371.34 | 17108791.44 | | | | |
| PT | 112+31.86 | 3880.68 | 3,888.08 | 2030370.52 | 17108769.64 | 99.69 | | | |
| US Riffle, DS Glide | 113+10.00 | 3880.91 | 3,888.63 | 2030358.62 | 17108692.41 | | | | |

PLAN VIEW




NEW CHANNEL PROFILE

| | | Date |
|---|---|---|
| Designed | K Hoffman | 7/2015 |
| Drawn | B Krueger | 7/2015 |
| Checked | S Becker | 7/2015 |
| Approved | | |

# PLAN & PROFILE STA 105+60–112+80

BIG SPRING CREEK RESTORATION PROJECT

MACHLER, ADAMS And MT FISH WILDLIFE & PARKS

FERGUS COUNTY MONTANA

United States Department of Agriculture

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File No. BigSpPlanPro.dwg

Drawing No. 15–31

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Sheet 6 of 21