Facility 442514
Received 7/8/2015
Document 2315132

Rule 908.b(5)
Site Plan

LINN Operating Inc.
O-29 Centralized E&P Waste Management Facility

OA Project No. 014-1565

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PROPOSED
O29-596 CENTRALIZED
E&P WASTE MANAGEMENT FACILITY
SITUATED IN SW1/4SE1/4 AND SE1/4SW1/4, SECTION 29, T. 5 S., R. 96 W. 6th P.M. GARFIELD COUNTY, COLORADO

AS-BUILT SHEET INDEX:

1 - Cover Sheet

2 - Project Location Map

3 - Location Map & Existing Wells

4 - As-Built Survey

5 - Pond Sections

SUPPLEMENTAL SHEET INDEX:

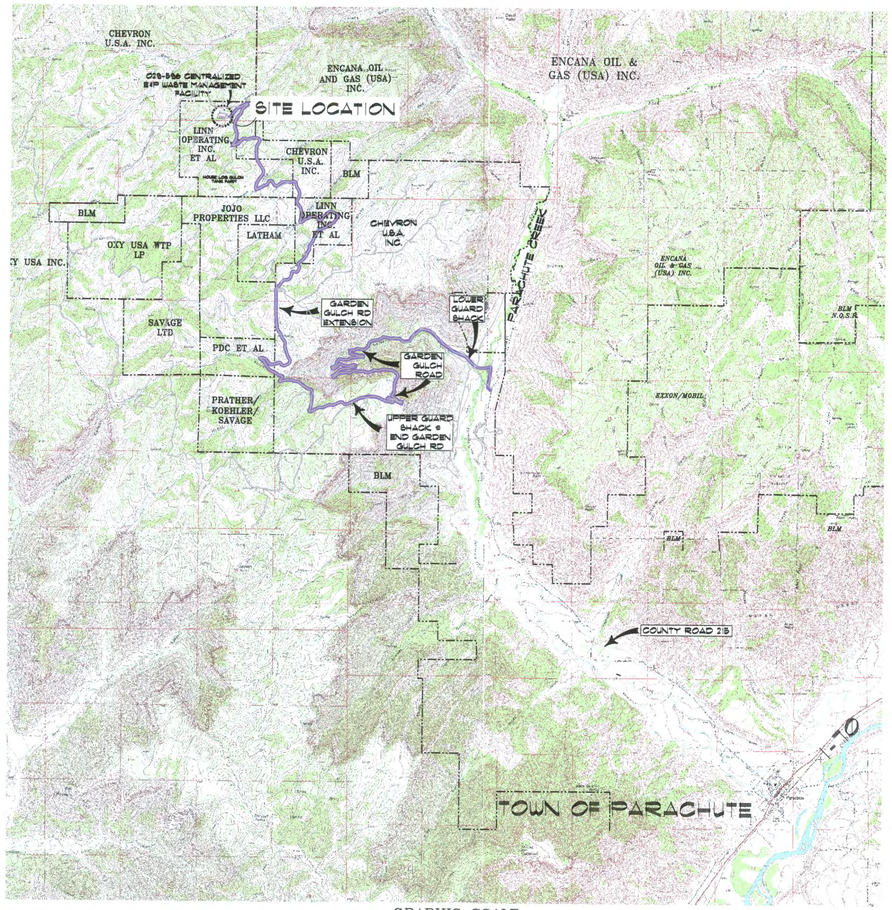
6 - Site Details

7 - Pit Liner Details

8 - Bird Netting Plans

9 - As-Built Grading

VICINITY MAP



GRAPHIC SCALE

5000 0 2500 5000 10000 20000

(IN FEET)
1 inch = 5000ft.

GENERAL NOTES:

1. These plans provide the As-Built and Construction details for the O29-596 Centralized E&P Waste Water Management Facility.
2. The Facility is located in the SW1/4SE1/4 and SE1/4SW1/4 Section 29, T.5S, R96W 6th PM, with a Lat. 39°34'46"N & Long. 108°11'29" W, Elevation 7918.9 ft MSL at the low point of the pond, Garfield County, Colorado.
3. Linn Operating, Inc., 235 Callahan Ave, Parachute, Colorado 81635 will be the COGCC operator of the O29-596 Centralized E&P Waste Management Facility.
4. Linn Operating, Inc. ET AL, 235 Callahan Ave, Parachute, Colorado 81635 is the surface land owner for the O29-596 Centralized E&P Waste Water Management Facility.
5. The site is considered to be in a sensitive area.
6. The site is located on the east side of Trail Ridge in an area of rolling hills. The geology of the site consists of sandy clayey soils from weathered sandstone, siltstone and claystones of the Uinta formation.
7. The adjacent land use currently consists of cattle grazing with Oil & Gas development surface operations.
8. Access to the site is limited to land owners, cattle ranchers and Oil & Gas operators allowed up the Garden Gulch Road Extension access road from the south.
9. An animal barrier fence and bird netting cover exist to restrain wildlife and water fowl from entering into the Waste Water Management pond.
10. Currently, no large bodies of water exist within 1 mile of the proposed site.
11. Linn Operating, Inc. has prepared the waste profile for the containment system in accordance with COGCC Rule 908.B.6.
12. See sheet 3 for Deep or Shallow Groundwater wells existing within 1 mile of the proposed site. A groundwater monitoring system consisting of four (4) wells 40+ ft deep as shown on the Pond Sections sheet is proposed.

STATE OF COLORADO REGISTERED GEORGE R. BAUER 27825 PROFESSIONAL LAND SURVEYOR 4/15/15

DRILL • BLAST • STABILIZATION • SCALING
ROCK SOLID SOLUTIONS
DESIGN • BUILD

OLSSON ASSOCIATES
760 Horizon Drive
Suite 102
Grand Junction, CO 81506
TEL 970.263.7800

O29-596 CENT. E&P WASTE MANAGE FACILITY

CLIENT:
LINN Operating, INC.
235 Callahan Ave.
Parachute, CO 81635
(970) 285-2200
Contacts: Tom Hogelin

LAND OWNER:
LINN Operating, INC.
235 Callahan Ave.
Parachute, CO 81635
(970) 285-2200
Contacts: Tom Hogelin

SURVEYOR:
Construction Surveys, Inc.
0012 Sunrise Blvd.
Silt, CO 81652
(970) 876-5753
Contact: George Bauer

ENGINEER:
Rock Solid Solutions
195 Lodgepole Circle
Parachute, CO 81635
(970) 987-2743
Contact: Don Berger

ENGINEER:
Olsson Associates
760 Horizon Drive
Suite 102
Grand Junction, CO 81506
(970) 263-7800
Contact: Lorne Prescott

LINN Energy
NASDAQ:LINE

CONSTRUCTION SURVEYS, INC.
0012 SUNRISE BLVD.
SILT, CO 81652
970-876-5753

PREPARED FOR:
LINN OPERATING, INC.
235 Callahan Avenue, Parachute, CO 81635

CONSTRUCTION SILT COLO. SURVEYS

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DATE: April 24, 2015	o29-596 E&P waste facility.dwg

COVER SHEET
SHEET 1 OF 9

029-596
CENTRALIZED
E&P WASTE
MANAGEMENT
FACILITY

CHEVRON
U.S.A. INC.

ENCANA OIL AND GAS
(USA) INC.

LINN
OPERATING,
INC
ET AL

GARDEN
GULCH RD
EXTENSION

CHEVRON
U.S.A.
INC.

BLM

JOJO PROPERTIES LLC

OXY USA
WTP LP

LINN
OPERATING,
INC.
ET AL

CHEVRON
U.S.A. INC.

BLM

GRAPHIC SCALE

1000 0 500 1000 2000 4000

(IN FEET)
1 inch = 1000 ft.

PROJECT LOCATION MAP

029-596 CENTRALIZED E&P WASTE MANAGEMENT FACILITY

SITUATED IN SW1/4SE1/4 AND SE1/4SW1/4, SECTION 29, T. 5 S., R. 96 W. 6th P.M. GARFIELD COUNTY, COLORADO

OLSSON ASSOCIATES
760 Horizon Drive
Suite 102
Grand Junction, CO 81506
TEL 970.263.7800

CONSTRUCTION SURVEYS, INC.
0012 SUNRISE BLVD.
SILT, CO 81652
970-876-5753

PREPARED FOR:
LINN OPERATING, INC.
235 Callahan Avenue, Parachute, CO 81635

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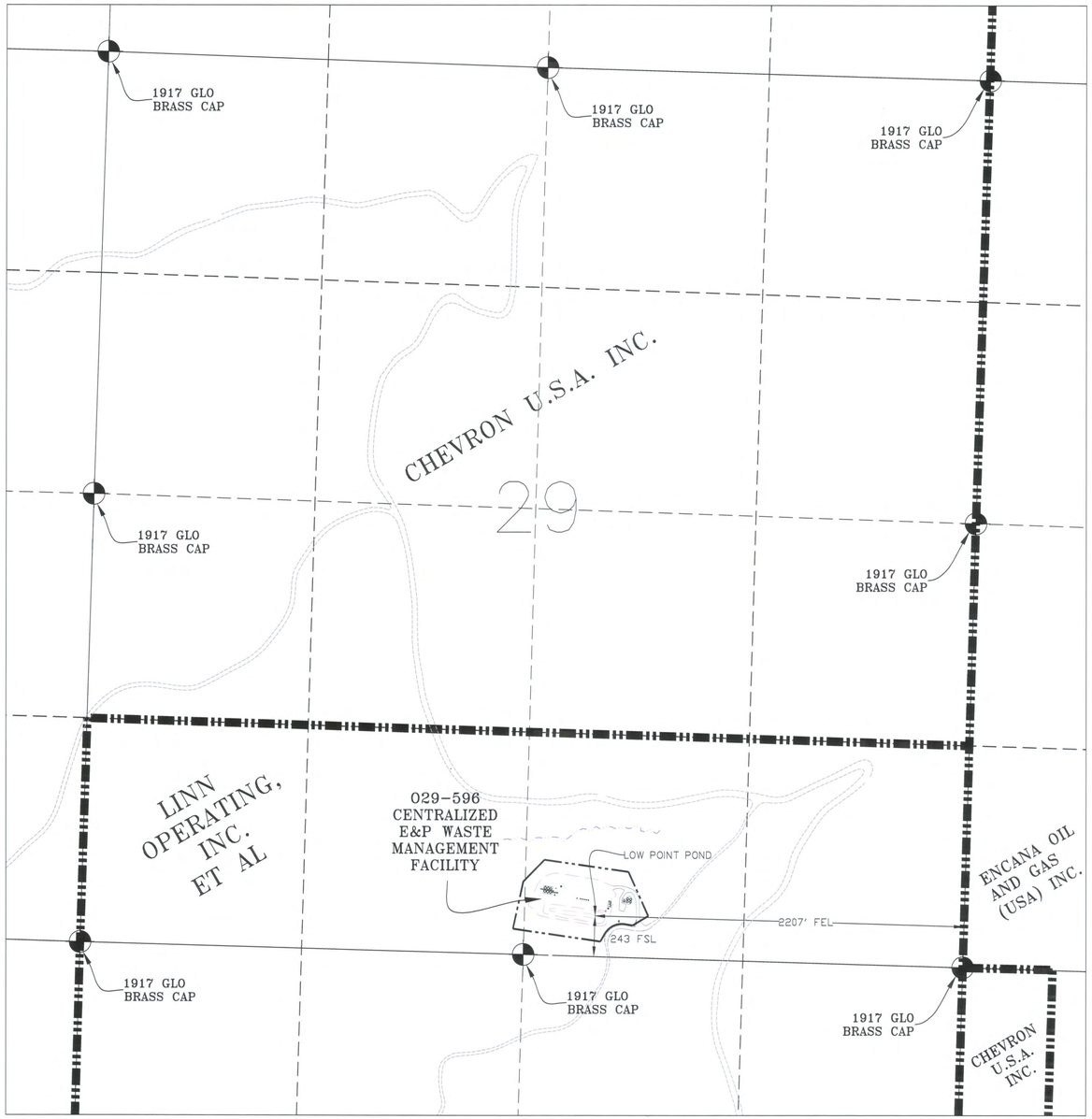
DATE: April 24, 2015	o29-596 E&P waste facility.dwg

PROJECT LOCATION MAP
SHEET 2 OF 9



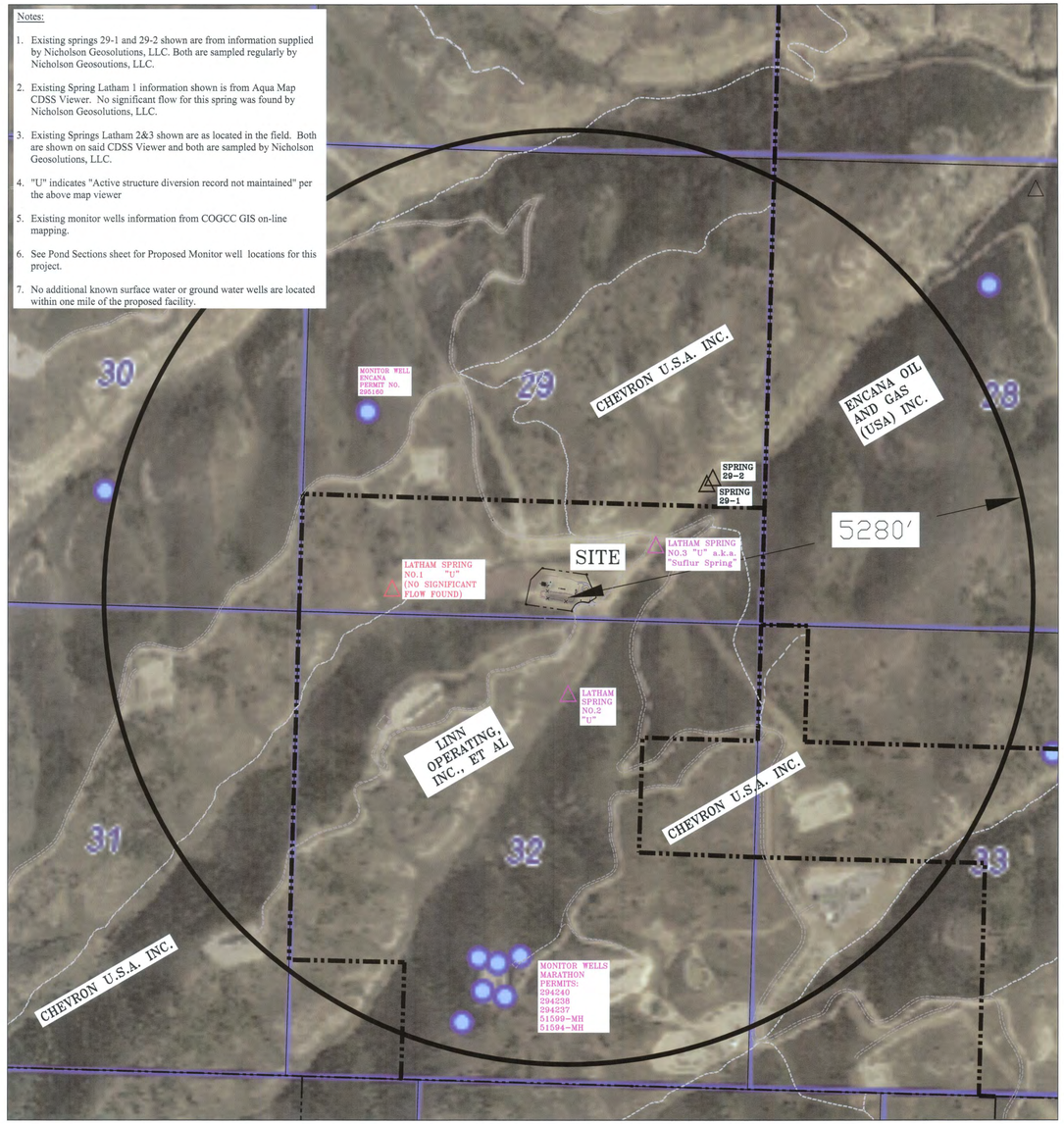
GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1 inch = 400 ft.

Notes:

1. Existing springs 29-1 and 29-2 shown are from information supplied by Nicholson Geosolutions, LLC. Both are sampled regularly by Nicholson Geosoutions, LLC.
2. Existing Spring Latham 1 information shown is from Aqua Map CDSS Viewer. No significant flow for this spring was found by Nicholson Geosolutions, LLC.
3. Existing Springs Latham 2&3 shown are as located in the field. Both are shown on said CDSS Viewer and both are sampled by Nicholson Geosolutions, LLC.
4. "U" indicates "Active structure diversion record not maintained" per the above map viewer
5. Existing monitor wells information from COGCC GIS on-line mapping.
6. See Pond Sections sheet for Proposed Monitor well locations for this project.
7. No additional known surface water or ground water wells are located within one mile of the proposed facility.



GRAPHIC SCALE

800 0 400 800 1600 3200

(IN FEET)
1 inch = 800 ft.

EXISTING WELLS AND SPRINGS WITHIN ONE MILE OF FACILITY

LOCATION MAP & EXISTING WELLS
029-596 CENTRALIZED E&P WASTE MANAGEMENT FACILITY
SITUATED IN SW1/4SE1/4 AND SE1/4SW1/4, SECTION 29, T. 5 S., R. 96 W. 6th P.M. GARFIELD COUNTY, COLORADO

GEORGE R. BROOKS 27925 6/15/15 PROFESSIONAL LAND SURVEYOR

LINN Energy NASDAQ:LINE

OLSSON ASSOCIATES
760 Horizon Drive
Suite 102
Grand Junction, CO 81506
TEL 970.263.7800

CONSTRUCTION SURVEYS, INC.
0012 SUNRISE BLVD.
SILT, CO 81652
970-876-5753

PREPARED FOR:
LINN OPERATING, INC.
235 Callahan Avenue, Parachute, CO 81635

CONSTRUCTION SILT COLO. SURVEYS

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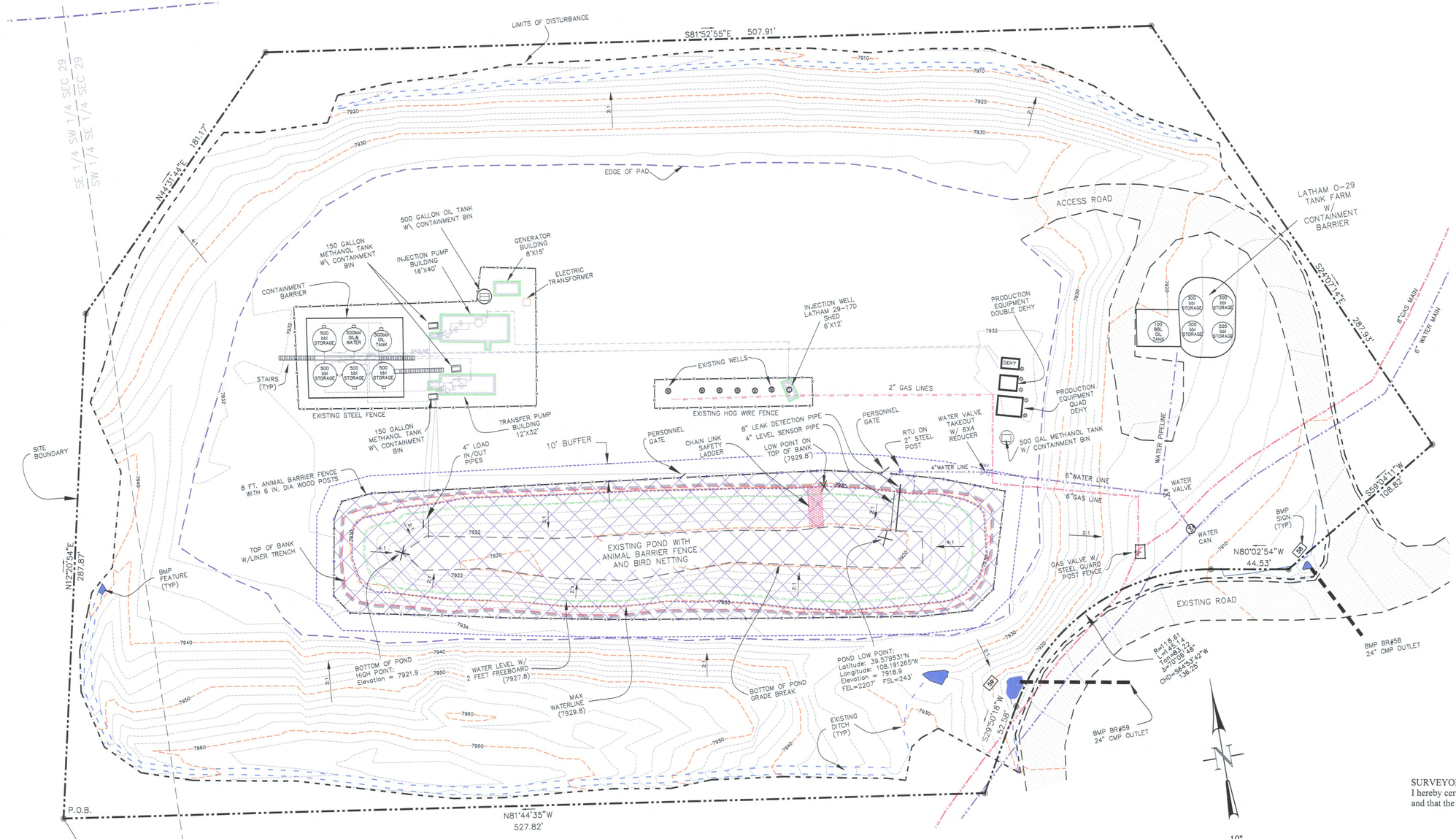
DATE: June 10, 2015	o29-596 E&P waste facility.dwg

LOCATION MAP & EXISTING WELLS
SHEET 3 OF 9



Legal Description:

A parcel of land situated in SE1/4 SW1/4 and the SW1/4 SE1/4 of Section 29, T. 5 S., R. 96 W. of the 6th Principal Meridian, County of Garfield, State of Colorado, the perimeter being more particularly described for area as follows:

Commencing at a found 1917 GLO brass cap in place for the S 1/4 corner common with Sections 29 & 32; whence a 1917 GLO brass cap in place for the section corner common with Sections 29, 30, 31 and 32 bears S88°18'36"E a distance of 2629.35 feet, with all bearings contained herein being relative thereto; thence N21°55'43"W a distance of 164.82 feet to the True Point of Beginning of the parcel described herein; thence N12°20'54"E a distance of 287.87 feet; thence N44°31'44"E a distance of 181.17 feet; thence S81°52'55"E a distance of 507.91 feet; thence S24°07'14"E a distance of 287.93; thence S59°04'11"W a distance of 108.82 feet; thence N80°02'54"W a distance of 44.53 feet; thence 145.14 feet along the arc of a curve to the left having a radius of 118.61 feet and a chord which bears S64°53'42"W a distance of 136.25 feet; thence S29°50'18"W a distance of 52.58 feet; thence N81°44'35"W a distance of 527.82 feet to the Point of Beginning, containing 6.41 acres more or less.

Notes:

1. The proposed site as shown and described above is not a boundary survey and no monuments were set, the purpose of the above Legal Description was to describe the perimeter and area within the Linn Operating, Inc. property for the proposed Centralized E&P Waste Management Facility.
2. Zoning district is Resource Lands - Plateau.
3. The landowner where the proposed Centralized E&P Waste Management Facility is located is Linn Operating, ET AL. Shown as Parcel 2135-321-00-009 Garfield County Clerk and Recorder being 880 acres more or less.
4. Basis of Bearing: Commencing at a found 1917 GLO brass cap in place for the S 1/4 corner common with Sections 29 & 32; whence a 1917 GLO brass cap in place for the section corner common with Sections 29, 32, 31 and 32 bears S88°18'36"E a distance of 2629.35 feet.
5. Contour interval = 2 feet
6. Elevation datum NAVD-88
7. Pad area = 121,123 sq.ft. (2.78 ac+/-) = 48%
   Access area= 9,255 sq.ft. (0.21 ac+/-) = 3%
   Slopes area= 123,164 sq.ft. (2.83 ac+/-) = 49%
   Total= 253,541 sq.ft. (5.82 ac+/-)
8. As-Built survey conducted on January 5, 2015 (operator R.E.W., PDOP=1.5) and December 7, 2010. (operator R.E.W., PDOP=2.2)
9. Low point on pond top of bank elevation = 7929.8'
10. 2 feet freeboard used for pond volume calculations (water level = 7927.8') see As-Built Pond info shown hereon.
11. Low point in bottom of pond shown is located 2207' fel and 243' fsl of Section 29. Elevation = 7918.9'.
12. As-Built pad elevation = 7931.0

As-Built Pond Info:

Approx. Pond Dimensions: 360' x 70'
Max Pit Depth: 10.9'
As-Built Pit Capacity: 16,649 BBL
(w/ 2' freeboard)

SURVEYOR'S CERTIFICATE:
I hereby certify that the survey shown hereon was conducted under my direct supervision and that the same is true and correct to the best of my knowledge and ability.

George R. Bauer
PLS # 27925

AS-BUILT SURVEY
029-596 CENTRALIZED E&P WASTE MANAGEMENT FACILITY
SITUATED IN SW1/4SE1/4 AND SE1/4SW1/4, SECTION 29, T. 5 S., R. 96 W. 6th P.M. GARFIELD COUNTY, COLORADO

LINN Energy
NASDAQ:LINE

OLSSON ASSOCIATES
760 Horizon Drive
Suite 102
Grand Junction, CO 81506
TEL 970.263.7800

CONSTRUCTION SURVEYS, INC.
0012 SUNRISE BLVD.
SILT, CO 81652
970-876-5753

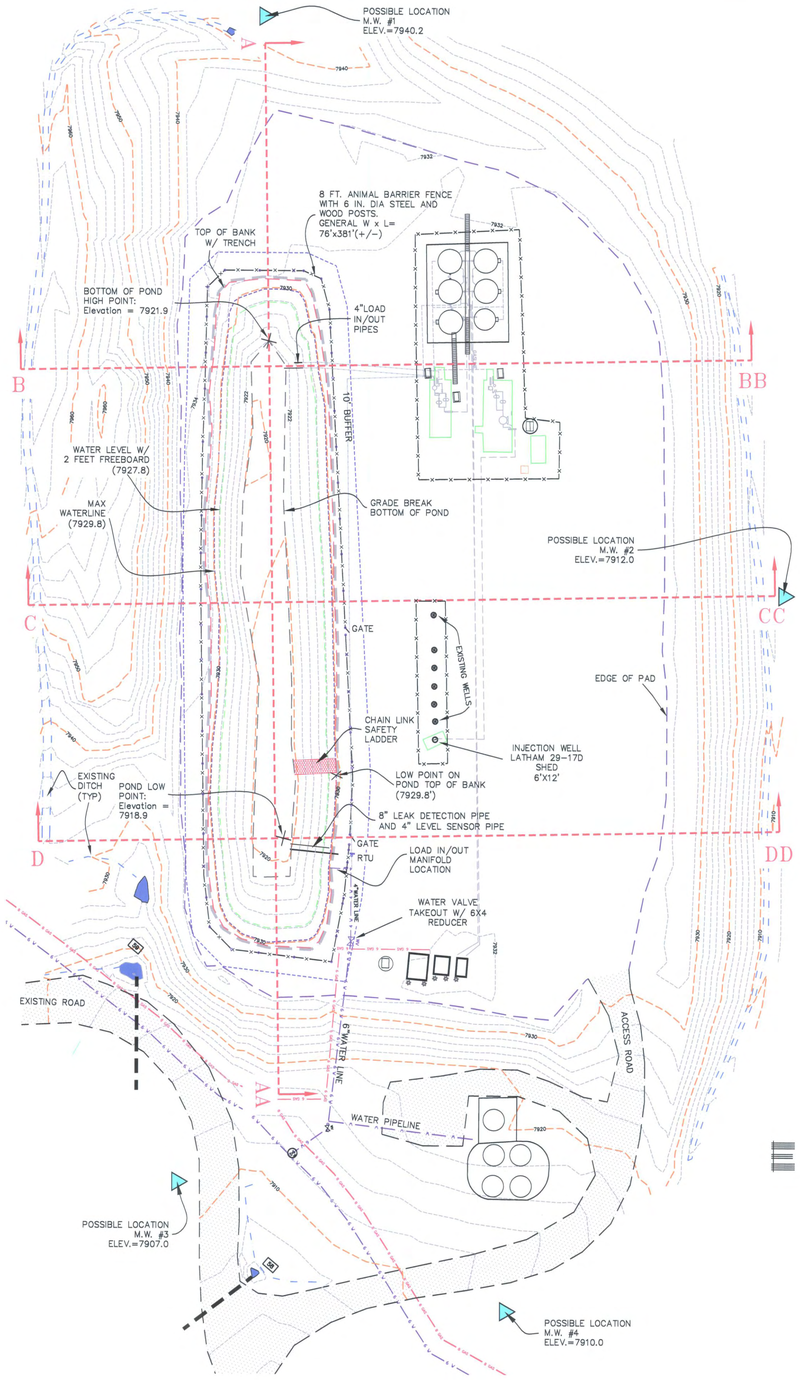
PREPARED FOR:
LINN OPERATING, INC.
235 Callahan Avenue, Parachute, CO 81635

DRAFTED BY: TH	CHECKED BY: GB
DATE: April 24, 2015	o29-596 E&P waste facility.dwg

STAGE STORAGE TABLE		
ELEVATION	VOLUME (CF)	VOLUME (bbl)
7918.9	0	0
7920	1,576	281
7921	7,615	1,356
7922	15,766	2,808
7923	25,371	4,519
7924	36,468	6,495
7925	49,118	8,748
7926	63,381	11,289
7927	79,315	14,127
*7927.8	93,477	16,649
7929	116,440	20,739
**7929.8	133,337	23,748

* PROPOSED MAXIMUM OPERATING WATER SURFACE ELEVATION AT 2' FREEBOARD.
**TOP OF BANK LOW POINT (OVERFLOW)

RED INDICATES ABOVE MAX OPERATING WATER SURFACE ELEVATION.



INDICATES PROPOSED GROUND WELL MONITORING LOCATIONS (POSSIBLE LOCATIONS)

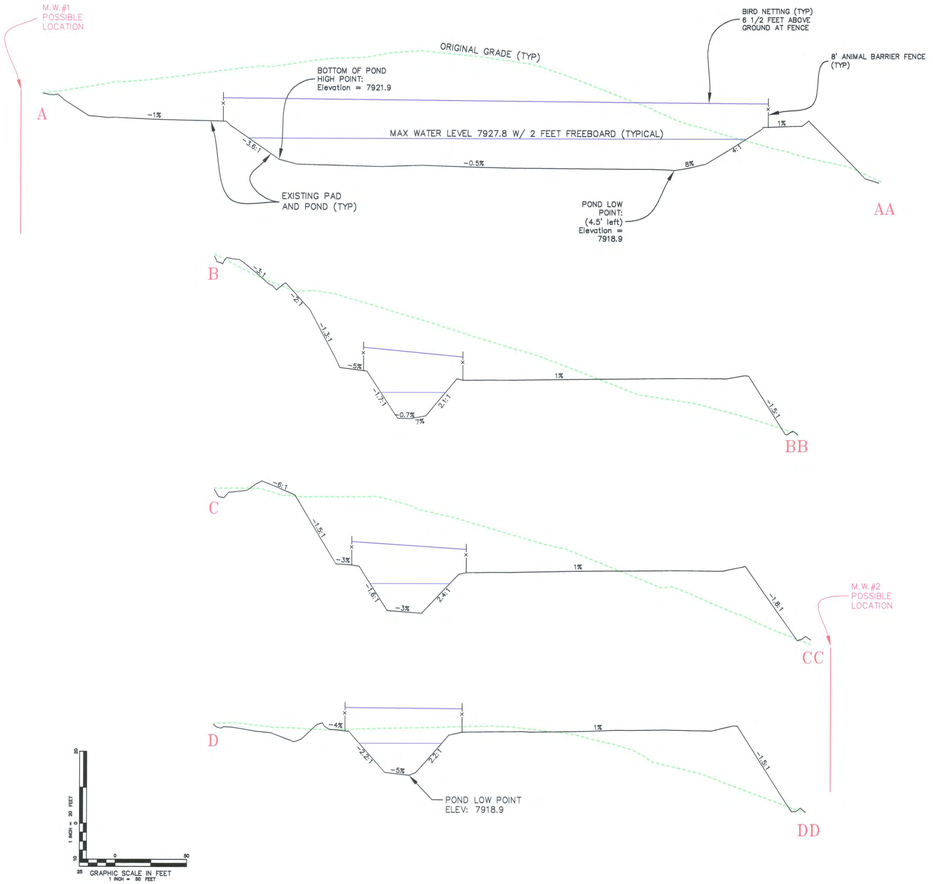
PLAN VIEW

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

(80°18')



POND SECTIONS

POND SECTIONS
029-596 CENTRALIZED E&P WASTE MANAGEMENT FACILITY
SITUATED IN SW1/4SE1/4 AND SE1/4SW1/4, SECTION 29, T. 5 S., R. 96 W. 6th P.M. GARFIELD COUNTY, COLORADO

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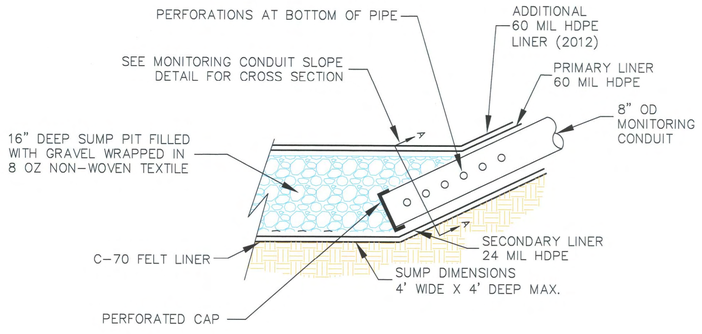
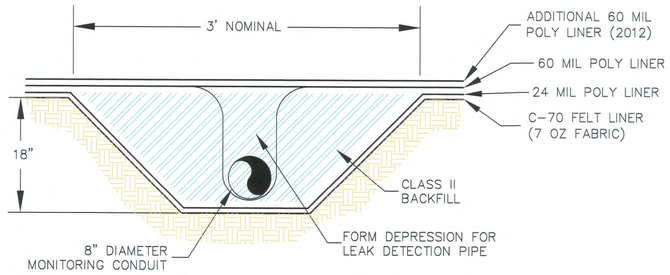
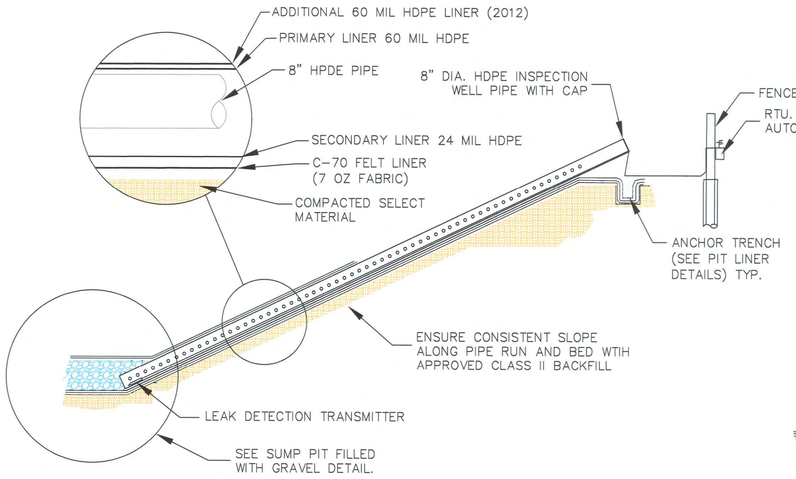
POND SECTIONS
SHEET 5 OF 9



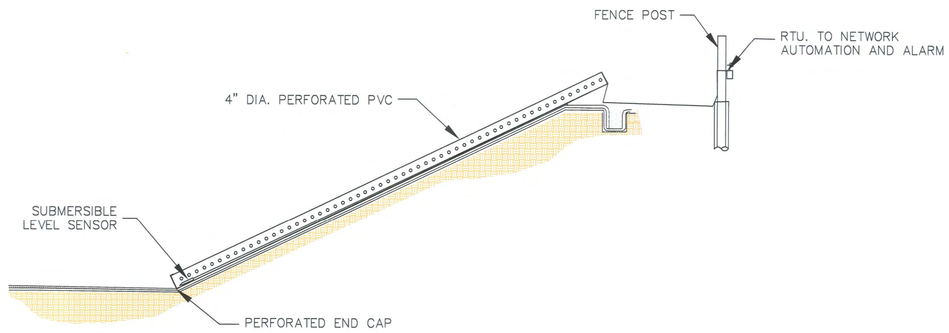
SUMP PIT FILLED WITH GRAVEL DETAIL
N.T.S



MONITORING CONDUIT SLOPE SECTION 'A' DETAIL
N.T.S



LEAK DETECTION DETAIL W/ PIPE RESTING ON SLOPE GRADE
N.T.S



SUBMERSIBLE LEVEL SENSOR DETAIL W/ PIPE RESTING ON SLOPE GRADE
N.T.S

NOTES:

GENERAL:

1. The O29 Facility Pond was Engineered and approved in 2011 as constructed.
2. The overflow containment berm at the edge of the pad was constructed using compacted on site fill materials.

EARTHWORK:

1. Existing benchmarks and monuments and other reference points were protected during construction.
2. Diversion of surface drainage during the period of earthwork kept excavations free of water during entire process of work, regardless of cause, source or nature of the water.
3. Prior to commencing finish grading, the excavation was checked for compliance with rough grading requirements shown on the design drawings and restored to desired lines, grade and cross section. The entire facility excavation has been graded to drain toward the low point where the leak detection sump and conduit system has been installed as shown on the drawings.
4. The finish excavation grade tolerance was plus zero and minus 2 inches to the lines and grades as indicated on the design drawings.
5. Areas not within the allowable tolerances have been corrected either by further excavation or scarifying, placing additional material, remixing, and reshaping to the specifications herein.

ANCHOR TRENCHES:

1. The Anchor Trench location for the Facility is as shown on the drawings.
2. Compacted select material run out were constructed as shown on the drawings. Subgrade surface in the run out area were smooth and free of sharp objects for placement of the liner.
3. Backfill within the Anchor Trench and runout area has been placed in 6-inch maximum thick lifts and wheel or bucket compacted with on site equipment. Tolerances for final grade over the run out and anchor trench were minus zero to plus 4 inches. Compaction efforts were observed by the designated representative.

LEAK DETECTION SYSTEM:

1. The Leak Detection System was installed by the Geosynthetic contractor as shown on the drawings. The Sump and Conduit was located as shown on the drawings. Inspection of the Leak Detection System by the owner and/or Engineer took place prior to placement of the Secondary and Primary containment liner systems.
2. The excavation for the pipeline route for the leak detection system was over excavated and backfilled with class 2 backfill or other approved material so that the Secondary liner and Leak Detection conduit rests in bedding material as shown on the drawings.
3. The Leak Detection sump was excavated so as to provide cover, bedding depth, and a minimum width as shown on the drawings.
4. No bends were allowed in the Leak Detection sampling conduit up the slope of the impoundment.
5. All excavations conform within the tolerances specified to the lines, grades, sections and elevations shown on the drawings and were shaped on the bottom so the bedding details shown on the drawings could provide uniform bearing and support for the entire liner, leak detection pipe and sump system.
6. The C-70 Felt liner (7 oz fabric) was placed throughout the entire pond basin, Leak Detection conduit and Sump area.
7. The secondary leak detection liner (24 ml) was placed into the excavation above the C-70 Felt liner. Special care was taken in the vicinity of the Leak Detection conduit & sump system.
8. The C-70 non-woven felt liner (7 oz Geotextile) was wrapped around the outside of the gravel sump and Leak Detection conduit. The C-70 non woven Felt liner fabric was placed over the top of the Sump prior to placement of the 60 mil poly Primary Containment Geomembrane liner.
9. The Primary liner was placed throughout the impoundment and over the Leak Detection Conduit and Sump area such that the 60 mil liner material was not deformed over the pipe and sump.
10. An additional 60 mil liner was placed over the primary liner in 2012.

HYDROTESTING:

1. Prior to completion of the project, Linn Operating, Inc. performed a hydro test of the installed system. The test consisted of filling the impoundment with fresh clean water to a minimum depth of 4-ft and a maximum depth of 8-ft. Using the water level monitoring system designed for the impoundment, the water level was measured in the impoundment to the highest accuracy of the monitoring system.
2. Linn Operating, Inc. monitored the water level in the impoundment for three (3) days to one (1) week. Documentation of the hydrotest began with an initial reading and consisted of follow-up readings a minimum of every 12 hours until a minimum of 72 hours had passed or a maximum of one week (168 hrs) had been achieved. Any change in the water level over the time period was noted.
4. Hydrotest Monitoring results will be maintained by Linn Operating, Inc. or designated operator for the life of the impoundment and provided to COGCC upon request.
5. Operations must be suspended immediately if a leak in the liner is observed.

COLORADO REGISTERED DONALD J. BERGER 26995 PROFESSIONAL ENGINEER

DRILL • BLAST • STABILIZATION • SCALING
ROCK SOLID SOLUTIONS
DESIGN • BUILD

(SUPPLEMENTAL)

SITE DETAILS

029-596 CENTRALIZED E&P WASTE MANAGEMENT FACILITY

SITUATED IN SW1/4SE1/4 AND SE1/4SW1/4, SECTION 29, T. 5 S., R. 96 W. 6th P.M. GARFIELD COUNTY, COLORADO

LINN Energy
NASDAQ: LINE

CONSTRUCTION SURVEYS, INC.
0012 SUNRISE BLVD.
SILT, CO 81652
970-876-5753

PREPARED FOR:
LINN OPERATING, INC.
235 Callahan Avenue, Parachute, CO 81635

CONSTRUCTION SILT COLO. SURVEYS

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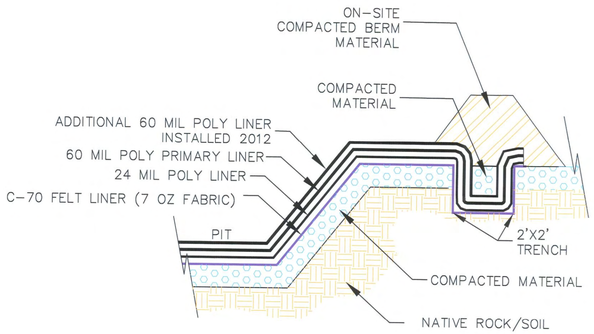
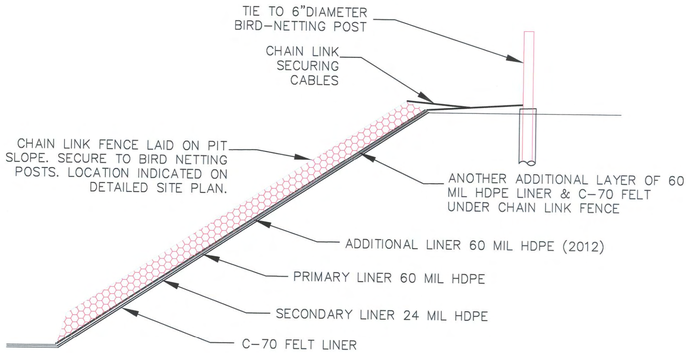
DATE: April 24, 2015	o29-596 E&P waste facility.dwg



LINER DETAIL
N.T.S



CHAIN LINK SAFETY LADDER DETAIL
N.T.S

NOTES:

GEOSYNTHETICS LINERS- GENERAL

1. The excavation and subgrade preparation was within the tolerances referenced in earthwork on the Site Details page prior to the installation of any Geosynthetic materials on the project.
2. A layer of C-70 Felt Liner was placed between the prepared subgrade and the Secondary Liner system to protect the Secondary Liner from protrusions and irregularities in the prepared subgrade.
3. Liner system encapsulates the pond, including the Leak Detection conduit and Sump system.
4. A Leak Detection sump and conduit up the side slope of the pond as shown on the drawings is an integral component of the impoundment system
5. The primary liner consists of a Textured 60 mil Poly (HDPE Geomembrane) Liner or equivalent as approved by the engineer.

GEOSYNTHETICS - 24 MIL AND 60 MIL TEXTURED HDPE (POLY) LINER(S) WERE INSTALLED UNDER THE FOLLOWING CONDITIONS AND GUIDELINES:

1. Prior to deployment of Geomembrane materials, the Geosynthetics contractor inspected, certified and accepted all surfaces on which the liner was placed to ensure conformance with the design and specifications. Surfaces identified as not in compliance with the specifications were rectified prior to placement of the Geosynthetic materials.
2. Liners were placed over the prepared surface using methods and procedures that ensured a minimum of handling. Geosynthetics contractor provided adequate temporary anchoring devices to prevent damage due to wind.
3. Liner material was handled in accordance with the manufacturer's instructions. All persons walking on or working around the liner material wore soft-sole shoes in accordance with the manufacturer's recommendations.
4. The liner was installed in a relaxed condition, such that it was free of tension or stress upon completion. All necessary precautions, including provisions for installing extra material, were taken to avoid "trampolining" of the Liner areas that were exposed.
5. Horizontal field seams on slopes were kept to a minimum. The uphill material was shingled over the downhill material with sufficient lapping distance on all seams. A minimum distance of 5 feet was allowed from the toe of slopes for any horizontal overlap on flat areas.
6. The Superintendent conducting deployment of the liner system has installed over 10m square feet of hdpe liner under the direction of a superior. The Superintendent provided qualifications of such experience, was in charge of the installation, and was provided by the Geosynthetic contractor.
7. Extreme care was taken by the Geosynthetic contractor in the preparation of the areas to be welded. Areas to be welded were cleaned and prepared according to the manufacturers means and methods as approved by the Engineer. All sheeting was welded by the Thermal Method.
8. The Geosynthetic contractor made all efforts to install the "Perfect" Liner System. A minimum number of seams, patches, and extrusions were used.
9. "Fish mouth" areas were not allowed. Where "fish mouth" areas were created the contractor cut, overlapped and extrusion welded over these areas. All completed welds were tightly bonded. Any membrane area showing distress due to excessive scuffing or puncture from any cause were replaced and/or repaired to the satisfaction of the Engineer.
10. Welding equipment was capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine was actually fusing the lining material to ensure changes in weather conditions could not affect the integrity of the weld.
11. The contractor inspected each seam, marking his name and the date of inspection at the end of each panel and weld. Any area showing a defect was marked and repaired in accordance with manufacturer's approved repair procedures.
12. Welding and seaming machines were checked for cleanliness. Visual inspection of the work included all field seams for squeeze out, footprint, melt, overlap, etc…

COLORADO REGISTERED DONALD J. BEZNER 26980 PROFESSIONAL ENGINEER

(SUPPLEMENTAL)

PIT LINER DETAILS

029-596 CENTRALIZED E&P WASTE MANAGEMENT FACILITY

SITUATED IN SW1/4SE1/4 AND SE1/4SW1/4, SECTION 29, T. 5 S., R. 96 W. 6th P.M. GARFIELD COUNTY, COLORADO

DRILL • BLAST • STABILIZATION • SCALING
ROCK SOLID SOLUTIONS
DESIGN • BUILD

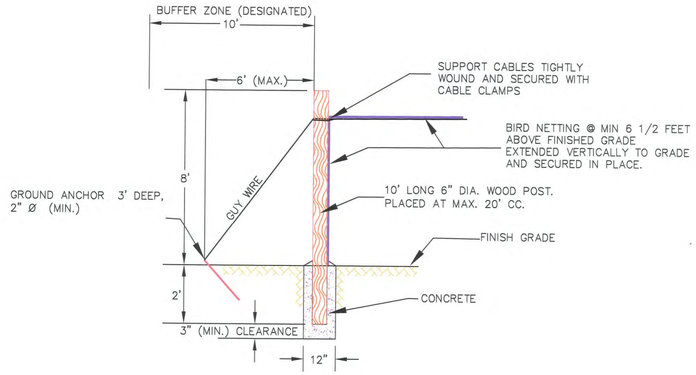
LINN Energy
NASDAQ: LINE

CONSTRUCTION SURVEYS, INC.
0012 SUNRISE BLVD.
SILT, CO 81652
970-876-5753

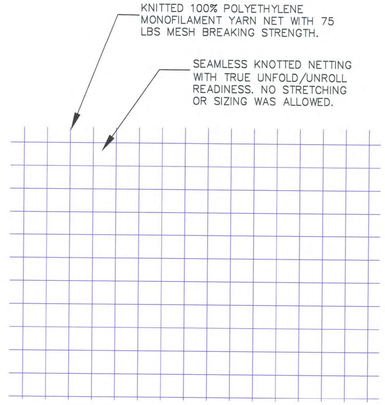
PREPARED FOR:
LINN OPERATING, INC.
235 Callahan Avenue, Parachute, CO 81635

CONSTRUCTION SURVEYS SILT COLO.

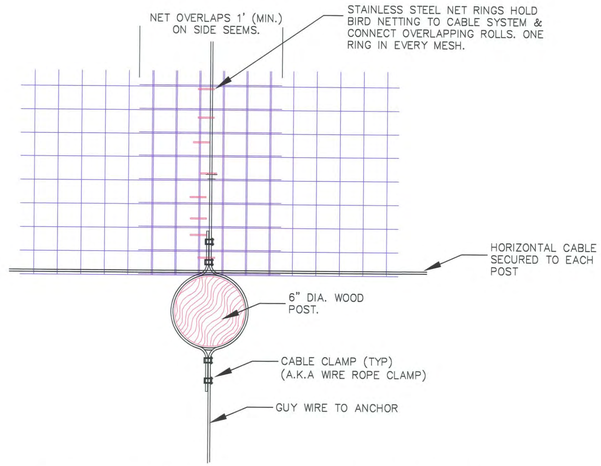
DRAFTED BY: TH	CHECKED BY: GB
DATE: April 24, 2015	o29-596 E&P waste facility.dwg



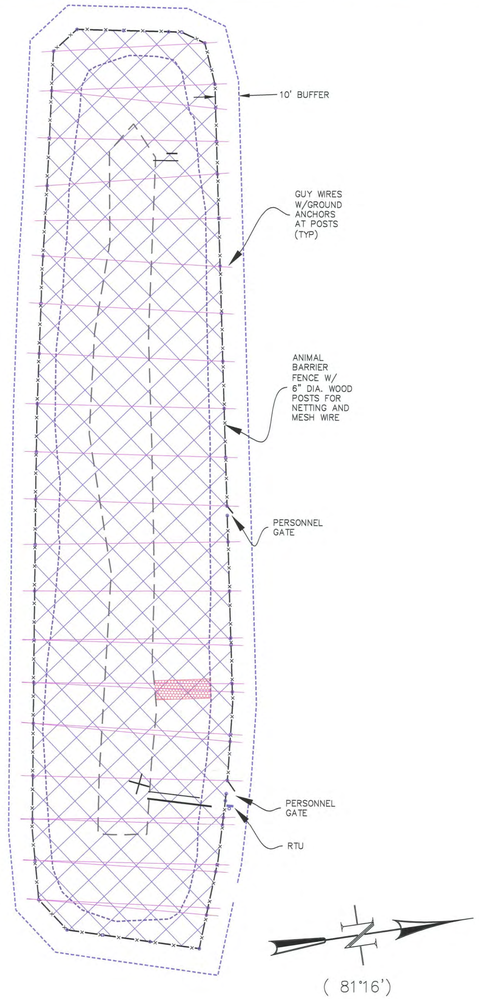
BIRD NETTING POST DETAIL
N.T.S



BIRD NETTING DETAIL
N.T.S



BASIC NET TO CABLE CONNECTION DETAIL
N.T.S

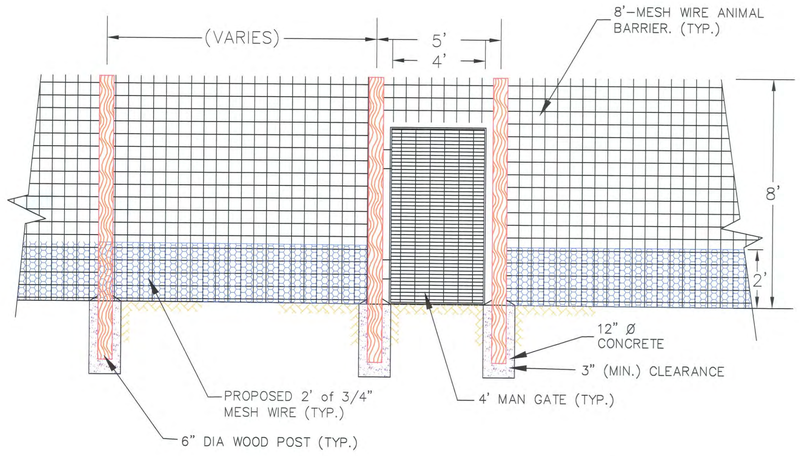


BIRD NETTING PLAN VIEW

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.



PERSONNEL GATE & ANIMAL BARRIER FENCE DETAIL
N.T.S

NOTES:

1. **Bird Netting is Toprite Netting Heavyweight as approved by the Engineer.**
2. **Bird Netting is knitted 100% Polypropylene monofilament yarn that is abrasion, rust, mildew, acid, alkalie, hydrogen sulfide and other chemical resistant with a low temperature rating of minus 50° F and a high temperature rating of 208° F (will not become tacky). The Netting is soft and flexible to prevent injuries.**
3. **The Bird netting has a knotted breaking strength of 75 lbs and a UV durability rating of 5 to 10 years.**
4. **Each net is a seamless piece that was unrolled and unfolded. No stretching or sizing was allowed before installation.**
5. **Netting was installed with a tensioned perimeter and support cable system per manufacturers details and guidelines.**
6. **Bird Netting was installed using tensioned cable hardware system. Major components of the system are identified on the drawings and include: cable, ferrules, wire rope clamps, clips, cable thimbles, eyebolts, ground anchors and net rings.**
7. **Sufficient length was used so that the netting reached across the impoundment and down the perimeter animal barrier fence and connects to the ground.**

DRILL • BLAST • STABILIZATION • SCALING
ROCK SOLID SOLUTIONS
DESIGN • BUILD

COLORADO REGISTERED DONALD J. BERGER 26385 PROFESSIONAL ENGINEER

(SUPPLEMENTAL)

BIRD NETTING PLANS

029-596 CENTRALIZED E&P WASTE MANAGEMENT FACILITY

SITUATED IN SW1/4SE1/4 AND SE1/4SW1/4, SECTION 29, T. 5 S., R. 96 W. 6th P.M. GARFIELD COUNTY, COLORADO

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CONSTRUCTION SILT COLO. SURVEYS

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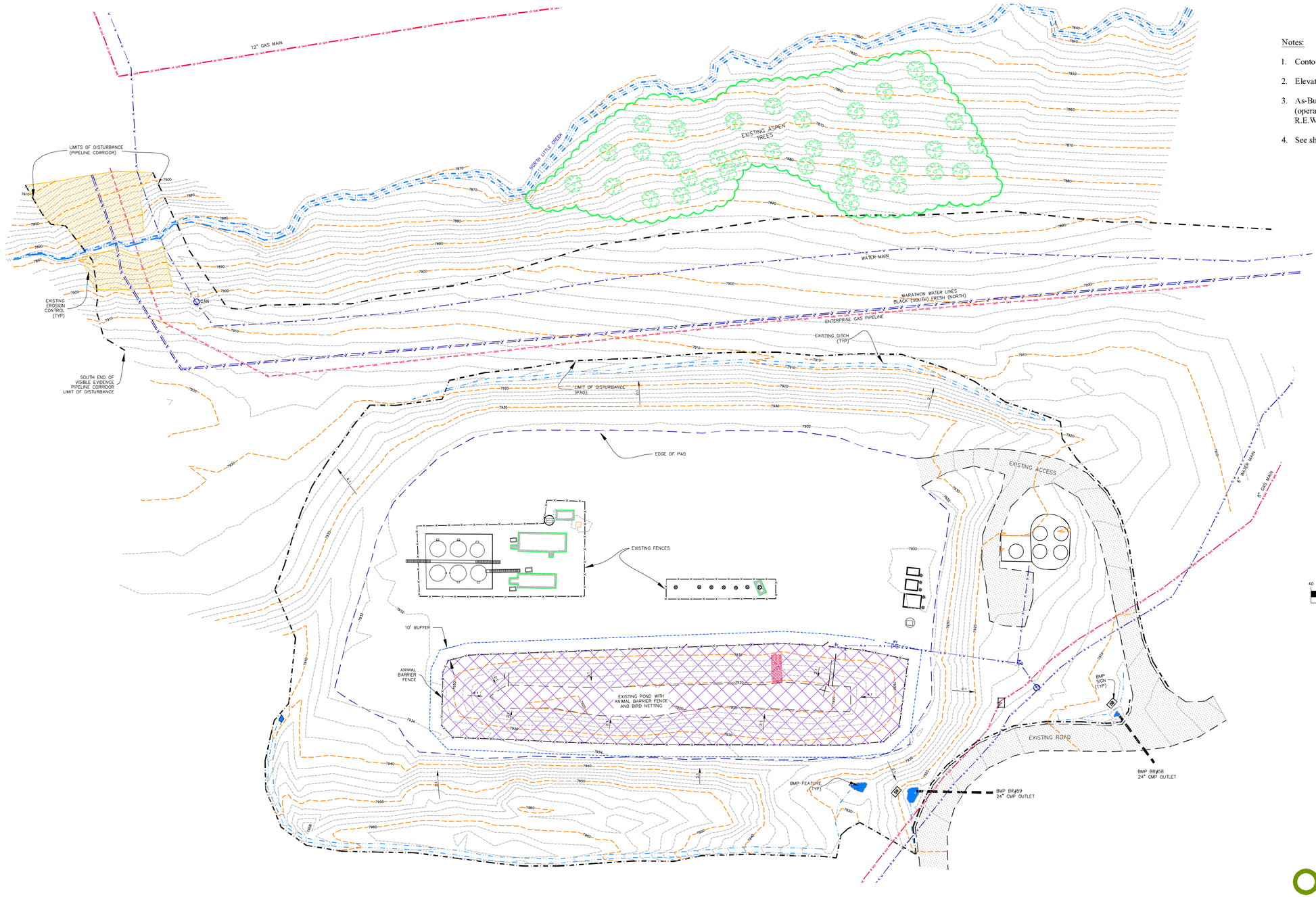

Notes:

1. Contour interval = 2 feet
2. Elevation datum NAVD-88
3. As-Built survey conducted on January 5, 2015, May 20, 2015 (operator R.E.W., PDOP=1.5) and December 7, 2010. (operator R.E.W., PDOP=2.2)
4. See sheets 4 and 5 of 9 for additional information.

(9°02')

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

OLSSON ASSOCIATES
760 Horizon Drive
Suite 102
Grand Junction, CO 81506
TEL 970.263.7800

(SUPPLEMENTAL)

AS-BUILT GRADING

029-596 CENTRALIZED E&P WASTE MANAGEMENT FACILITY

SITUATED IN SW1/4SE1/4 AND SE1/4SW1/4, SECTION 29, T. 5 S., R. 96 W. 6th P.M.
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CONSTRUCTION SILT COLO. SURVEYS

DRAFTED BY: TH	CHECKED BY: GB
DATE: May 21, 2015	o29-596 E&P waste facility.dwg

AS-BUILT GRADING
SHEET 9 OF 9