

## **Required Crossing Criteria for Reclamation Facilities**

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# RECLAMATION

*Managing Water in the West*

## **TransCanada Keystone XL Pipeline**

### **Required Crossing Criteria for Reclamation Facilities**

**August 2010**



**U.S. Department of the Interior  
Bureau of Reclamation  
Great Plains Region**

**Oglala Sioux Rural Water Crossing**

## **Oglala Sioux Rural Water Supply System South Dakota**

NW1/4, Section 36, T1S, R29E, Jones County

The Oglala Sioux Rural Water Supply System supplies treated drinking water from the Missouri River to numerous cities and residents in the south-central part of South Dakota.

**Damages.** The Bureau of Reclamation or Oglala Sioux Rural Water Supply System (OSRWSS) shall not be responsible for any loss or damage to property arising from the issuance of this permit, including but not limited to damages to growing crops, animals, and machinery; or injury to TransCanada or its associates, officers, agents, employees, or any others who are on the premises; or for damages or interference caused by natural phenomena. TransCanada agrees to save Reclamation, OSRWSS or any of its assigns or agencies harmless from any and all claims for damages or losses that may arise from or be incidental to any activity associated with this permit. TransCanada also agrees to save Reclamation, OSRWSS, or its assigns and agencies, harmless from any damage to TransCanada or third parties resulting from project activities of Reclamation, OSRWSS, its agents and assigns.

**Liability.** The permitted activities shall be conducted so as not to interfere with the operation, maintenance, and administration of the OSRWSS Core System pipeline. Any additional repairs, maintenance, or expense to the OSRWSS Core System pipeline as a result of the permitted activities shall be reimbursed to the OSRWSS by TransCanada. The Secretary of the Interior's determination of such expense shall be final and binding upon the parties hereto. TransCanada is responsible for any costs associated with impacts to their facility caused by modifications or relocations of the OSRWSS Core System pipeline and for costs incurred by OSRWSS for modifications or relocations due to the presence of TransCanada.

**Interruption of Service:** TransCanada shall make provisions acceptable to Reclamation and OSRWSS for any activity conducted by TransCanada that causes water service in the OSRWSS Core System pipeline to be interrupted. Such provisions may include advance notification of the service interruption and temporary facilities to continue water service for interruptions lasting longer than 24 hours.

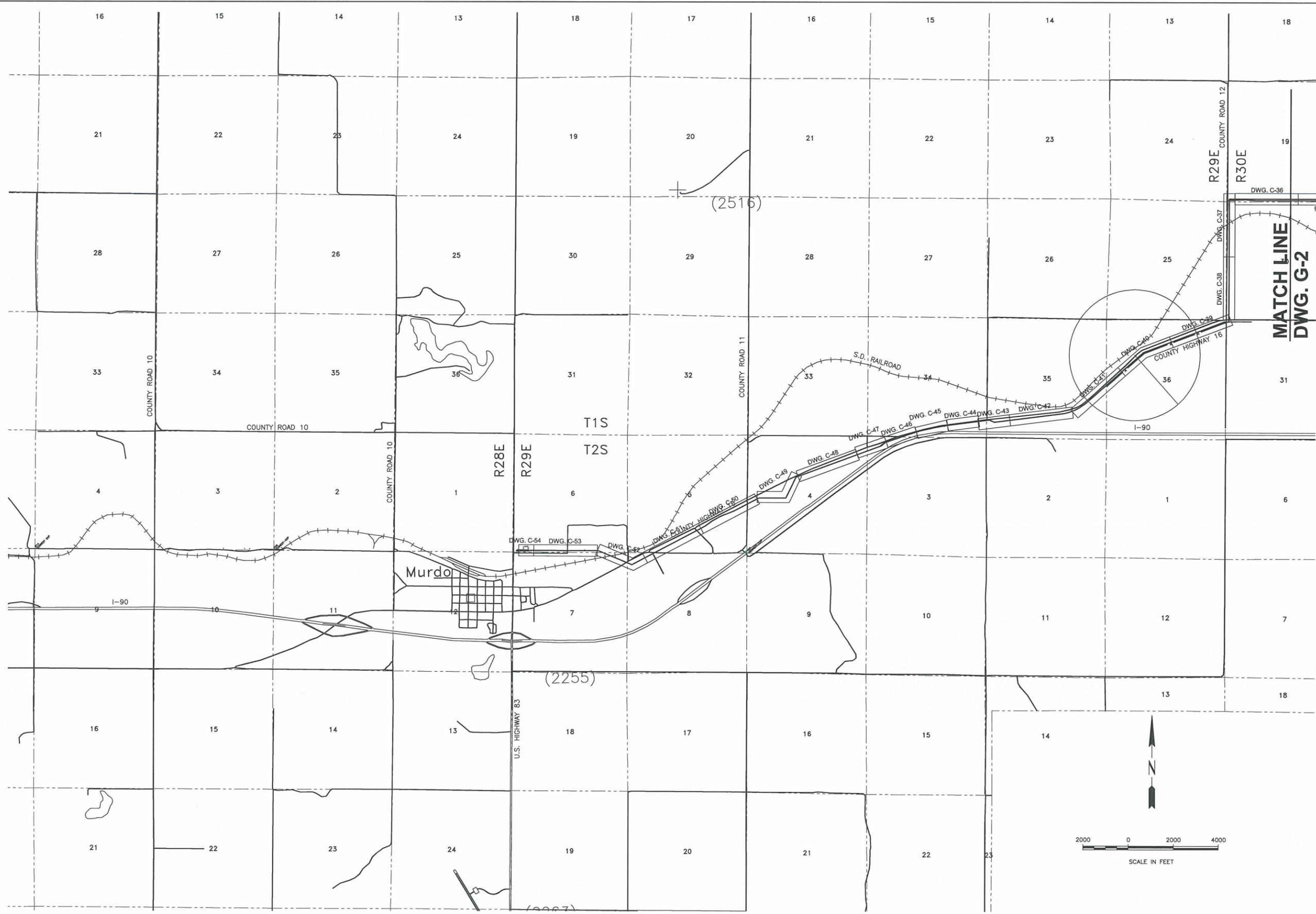
TransCanada shall comply with the requirements shown on the following drawings:

1. Drawing G-3 showing the general location of the OSRWSS steel pipeline crossing
  2. Drawing C-40 showing the plan and profile of the OSRWSS steel pipeline crossing.
  3. Drawing CP-1 showing the Corrosion Protection Requirements
- Not later than 45 days before start of construction, TransCanada shall provide OSRWSS and Reclamation with drawings and specifications for review and comment of all features of construction at the crossing, including cathodic protection. Comments to TransCanada will be concluded within 30 days, and TransCanada shall incorporate those comments in the plans and specifications for the crossing.
  - Not later than 10 days before start of construction, TransCanada shall provide OSRWSS with notice of the start of construction to facilitate monitoring and observation by

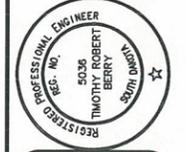
OSRWSS. TransCanada shall be responsible for addressing landowner concerns, issues and interests within the OSRWSS right-of-way or easement.

- TransCanada shall bore under the OSRWSS pipeline right-of-way, which is 75 feet wide.
- OSRWSS has a buried fiber optic cable installed with its pipeline that was placed by plow; its precise location is unknown. The burial depth information provided on the drawings is for information purposes only. TransCanada shall undertake exploratory excavations (potholing) to determine the exact burial depth for both the OSRWSS core pipeline and fiber optic line prior to starting crossing designs and construction of their pipeline.
- The OSRWSS Core System steel pipeline is protected by an induced current ground bed. TransCanada must coordinate and correspond with OSRWSS's corrosion experts and Reclamation during and after construction to assess the potential impacts of interference of its pipeline.
- TransCanada shall receive OSRWSS and Reclamation's review and approval of crossing specifications and drawings prior to starting work, including on the cathodic protection design, to assure it does not impact the OSRWSS Core System or its cathodic protection system.
- TransCanada shall install test stations as shown on Drawing CP-1.
- TransCanada shall not use a casing pipe when jacking under OSRWSS due to potential cathodic protection interference problems. If this is not possible, then TransCanada must provide a cathodic protection plan for review, comment, and approval from OSRWSS and Reclamation which accounts for the casing pipe.
- TransCanada shall maintain a minimum clearance of 18 inches between pipelines, in accordance with *Recommended Standards for Water Works (Tens States Standards), 2003 Edition, page 115*.
- TransCanada shall install detectable warning tape, above ground signage (noting Keystone Pipeline location), and provide as-built copies of the Keystone XL Pipeline crossings to OSRWSS and Reclamation within 90 days of substantial completion.
- TransCanada must design its crossings such that the OSRWSS Core System pipeline suffers no reduction in working pressure rating or pipeline integrity due to the operations of TransCanada.

R:\2246\Trans Canada Keystone XL Pipeline\MMI DSRWSS Recommendations\Phase VI sitebase.dwg Apr/12/2010



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APPR. BY: TRB	DATE: 2/2001
BY: C.A. REVIEW	DATE:

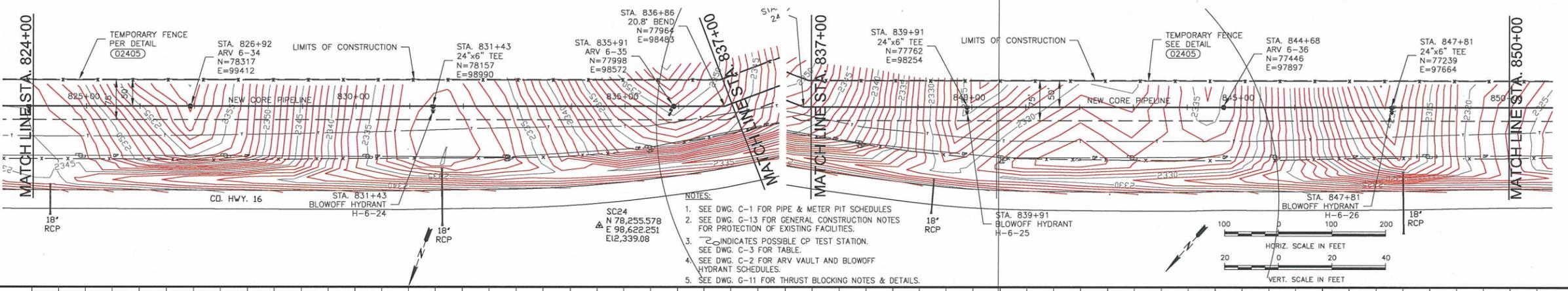
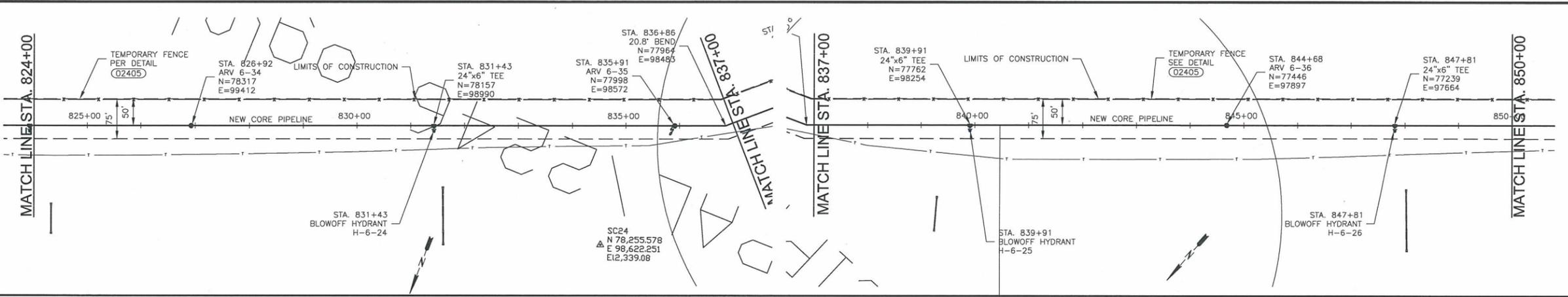
MNI WICONI CORE PIPELINE - PHASE VI  
 OGLALA SIOUX RURAL WATER SUPPLY SYSTEM

KEY MAP

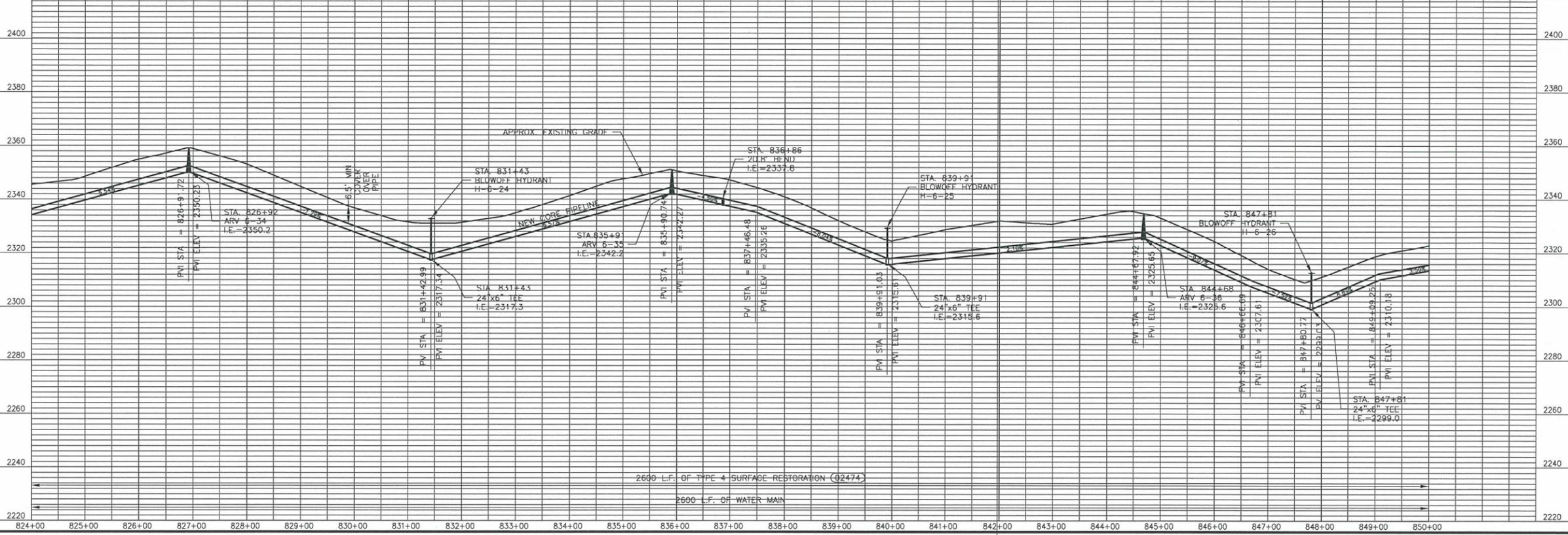
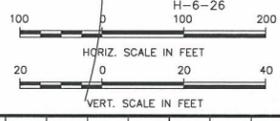
PROJECT NO.  
2246.012.02  
 SHEET NUMBER  
3  
 DRAWING NUMBER  
G-3

RECORD DRAWING 11/24/03 GVE

H:\MUNICIPAL\2246 ogla\PHASE VI\acc\ahic-40.dwg Apr/12/2010



- NOTES:
1. SEE DWG. C-1 FOR PIPE & METER PIT SCHEDULES
  2. SEE DWG. G-13 FOR GENERAL CONSTRUCTION NOTES FOR PROTECTION OF EXISTING FACILITIES.
  3. "C" INDICATES POSSIBLE CP TEST STATION. SEE DWG. C-3 FOR TABLE.
  4. SEE DWG. C-2 FOR ARV VAULT AND BLOWOFF HYDRANT SCHEDULES.
  5. SEE DWG. G-11 FOR THRUST BLOCKING NOTES & DETAILS.



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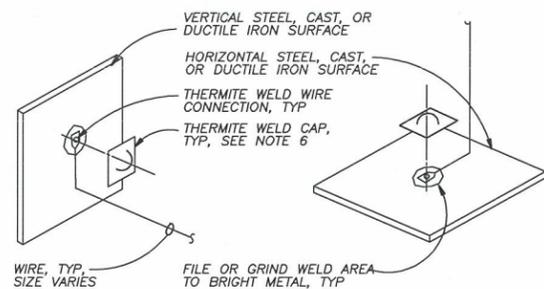
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 CHK'D BY: JMB  
 APPR. BY: JSB  
 DATE: 02/20/01  
 BY: G.A. REVIEW  
 DATE:  

**MINI WICONI CORE PIPELINE - PHASE VI**  
 OGLALA SIOUX RURAL WATER SUPPLY SYSTEM  
 FINISHED WATER - PLAN & PROFILE  
 STA. 824+00 TO STA. 850+00

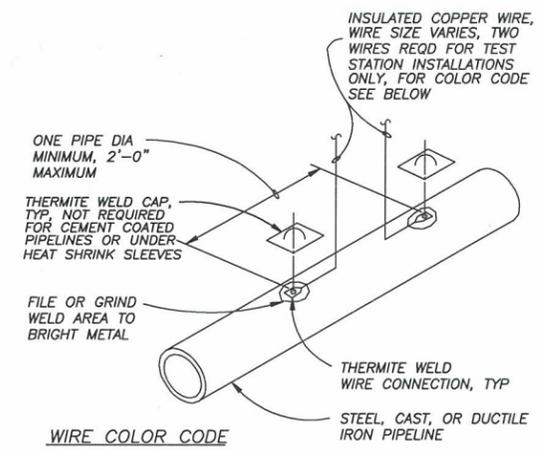
PROJECT NO. 2246.012.02  
 SHEET NUMBER 47  
 DRAWING NUMBER C-40



- NOTES:**
1. COPPER SLEEVE REQUIRED FOR THERMITE WELDING OF #10 AWG AND SMALLER WIRE.
  2. USE COPPER SLEEVE FOR THERMITE WELDING OF #4 AND #2 AWG JOINT BONDING WIRES.
  3. WELDER AND CARTRIDGE SIZE VARIES ACCORDING TO SURFACE SHAPE, MATERIAL AND HORIZONTAL OR VERTICAL SURFACE. CONSULT WELDER MANUFACTURER FOR RECOMMENDED WELDER AND CARTRIDGE.
  4. FOR MULTIPLE WIRE CONNECTIONS TO PIPE SEPARATE THERMITE WELD WIRE CONNECTIONS BY ONE PIPE DIAMETER MINIMUM, 2'-0" MAXIMUM.
  5. USE 15 GRAM MAXIMUM SIZE WELD CARTRIDGES FOR CONNECTIONS TO PETROLEUM AND NATURAL GAS PIPELINES OR STRUCTURES. WIRE CONNECTIONS SHALL BE AS SPECIFIED AND APPROVED BY THE OWNER.
  6. COMPLETE THERMITE WELD CONNECTIONS IN ACCORDANCE WITH (13903)
  7. COAT COMPLETED THERMITE WELD CONNECTIONS WITH ROYSTON HANDYCAP II AND 747 PRIMER OR HEAT SHRINK SLEEVE AS SPECIFIED.
  8. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE (13902)
  9. ATTACH THERMITE WELD TO STUD OR WELD BASE PLATE IF PROVIDED.

**WIRE CONNECTION FOR VERTICAL AND HORIZONTAL SURFACES** (13901)  
NTS

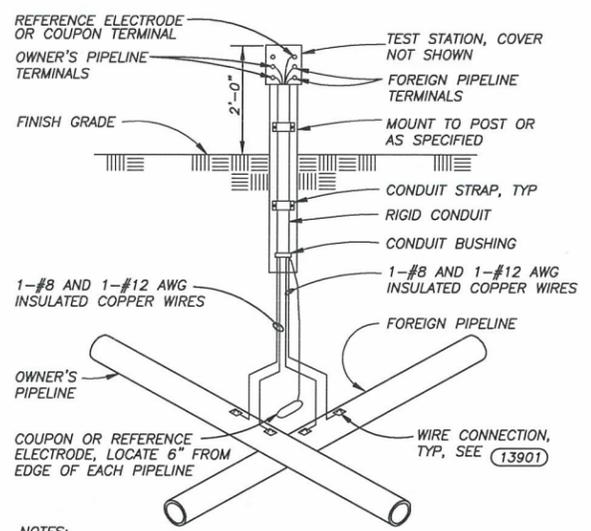
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- WIRE COLOR CODE**
1. PIPELINE TEST WIRES:  
WATER - BLUE  
FOREIGN PIPELINES - WHITE OR AS REQUESTED BY FOREIGN PIPELINE COMPANY
  2. UNPROTECTED PIPELINE - BLACK
  3. CASINGS - ORANGE
  4. ANODE LEADS - BLACK
  5. REFERENCE ELECTRODE WIRES - YELLOW

**PIPELINE WIRE CONNECTION** (13902)  
NTS

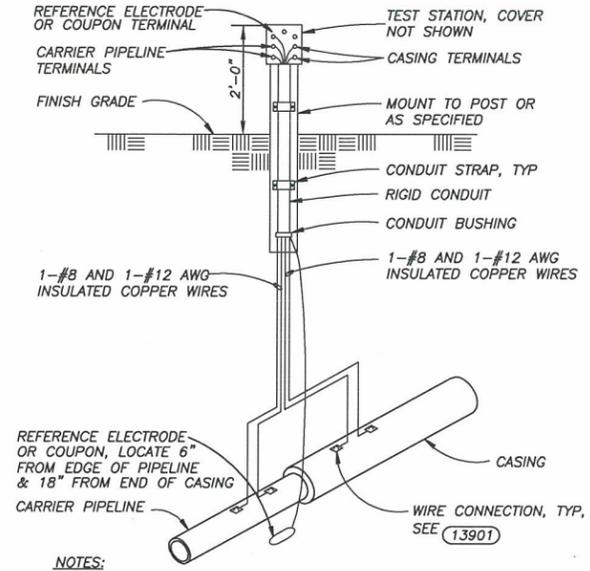
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- NOTES:**
1. OBTAIN APPROVAL OF FOREIGN PIPELINE OWNER PRIOR TO EXCAVATION.
  2. WIRE CONNECTIONS TO FOREIGN PIPELINE SHALL BE MADE BY FOREIGN PIPELINE REPRESENTATIVE.
  3. INSTALL REFERENCE ELECTRODES OR COUPONS ONLY AT TEST STATIONS INDICATED ON TEST STATION LOCATION SCHEDULE.
  4. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE (13902)

**TYPE P-F POST MOUNTED TEST STATION** (13923)  
NTS

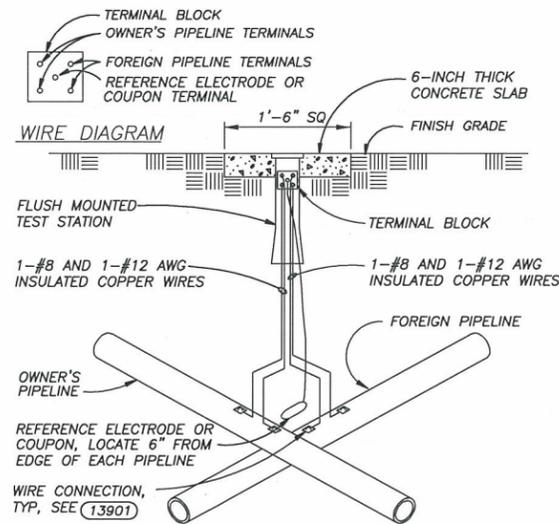
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- NOTES:**
1. INSTALL REFERENCE ELECTRODES OR COUPONS ONLY AT TEST STATIONS INDICATED ON TEST STATION LOCATION SCHEDULE.
  2. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE (13902)

**TYPE P-C POST MOUNTED TEST STATION** (13924)  
NTS

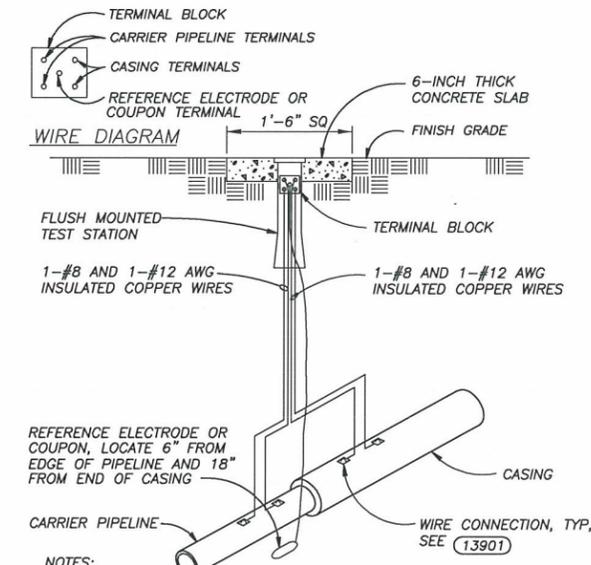
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- NOTES:**
1. OBTAIN APPROVAL OF FOREIGN PIPELINE OWNER PRIOR TO EXCAVATION.
  2. WIRE CONNECTIONS TO FOREIGN PIPELINE SHALL BE MADE BY FOREIGN PIPELINE REPRESENTATIVE.
  3. PROVIDE SUFFICIENT SLACK IN TEST WIRES TO ALLOW TERMINAL BLOCK TO EXTEND 18" OUT OF TEST STATION. COIL WIRES IN TEST STATION.
  4. INSTALL REFERENCE ELECTRODES OR COUPON ONLY AT TEST STATIONS INDICATED ON TEST STATION LOCATION SCHEDULE.
  5. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE (13902)

**TYPE F-F FLUSH MOUNTED TEST STATION** (13933)  
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- NOTES:**
1. PROVIDE SUFFICIENT SLACK IN TEST WIRES TO ALLOW TERMINAL BLOCK TO EXTEND 18" OUT OF TEST STATION. COIL WIRES IN TEST STATION.
  2. INSTALL REFERENCE ELECTRODES OR COUPON ONLY AT TEST STATIONS INDICATED ON TEST STATION LOCATION SCHEDULE.
  3. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE (13902)

**TYPE F-C FLUSH MOUNTED TEST STATION** (13934)  
NTS

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REG. NO. 5036  
TIMOTHY ROBERT BERRY  
SOUTH DAKOTA

DRAWN BY: JMH  
CHK'D BY: JMH  
APPR BY: TRB  
DATE: 4/20/10  
Q.A. REVIEW BY: DATE:

OGLA LA SIOUX RURAL WATER SUPPLY SYSTEM  
TransCanada Keystone Pipeline Crossing of Saurh Core Pipeline  
Near Draper SOUTH DAKOTA

CORROSION PROTECTION DETAILS

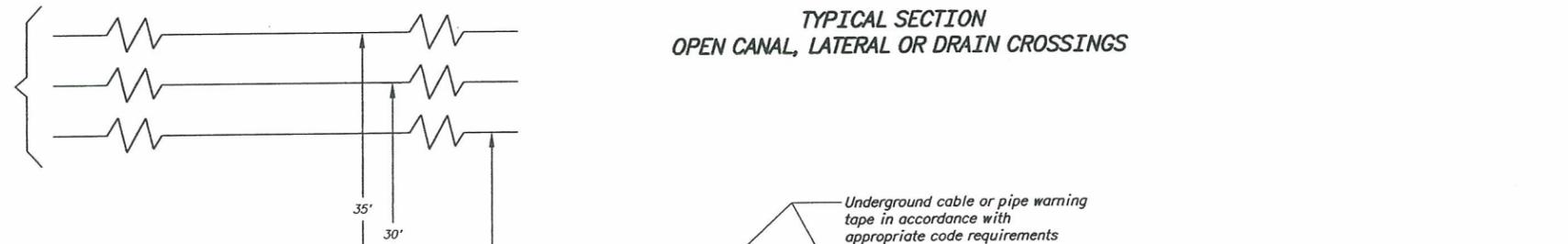
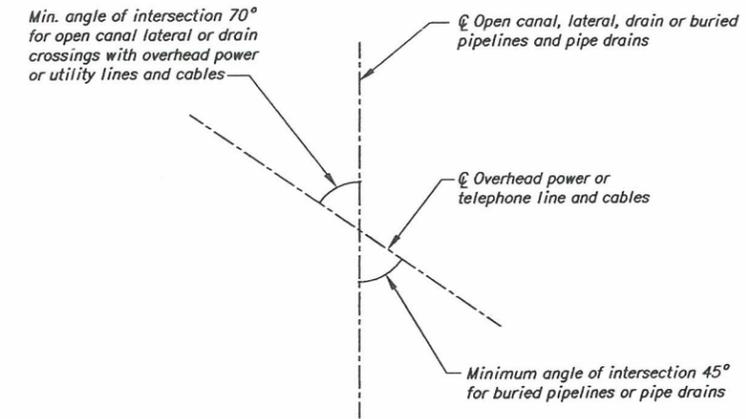
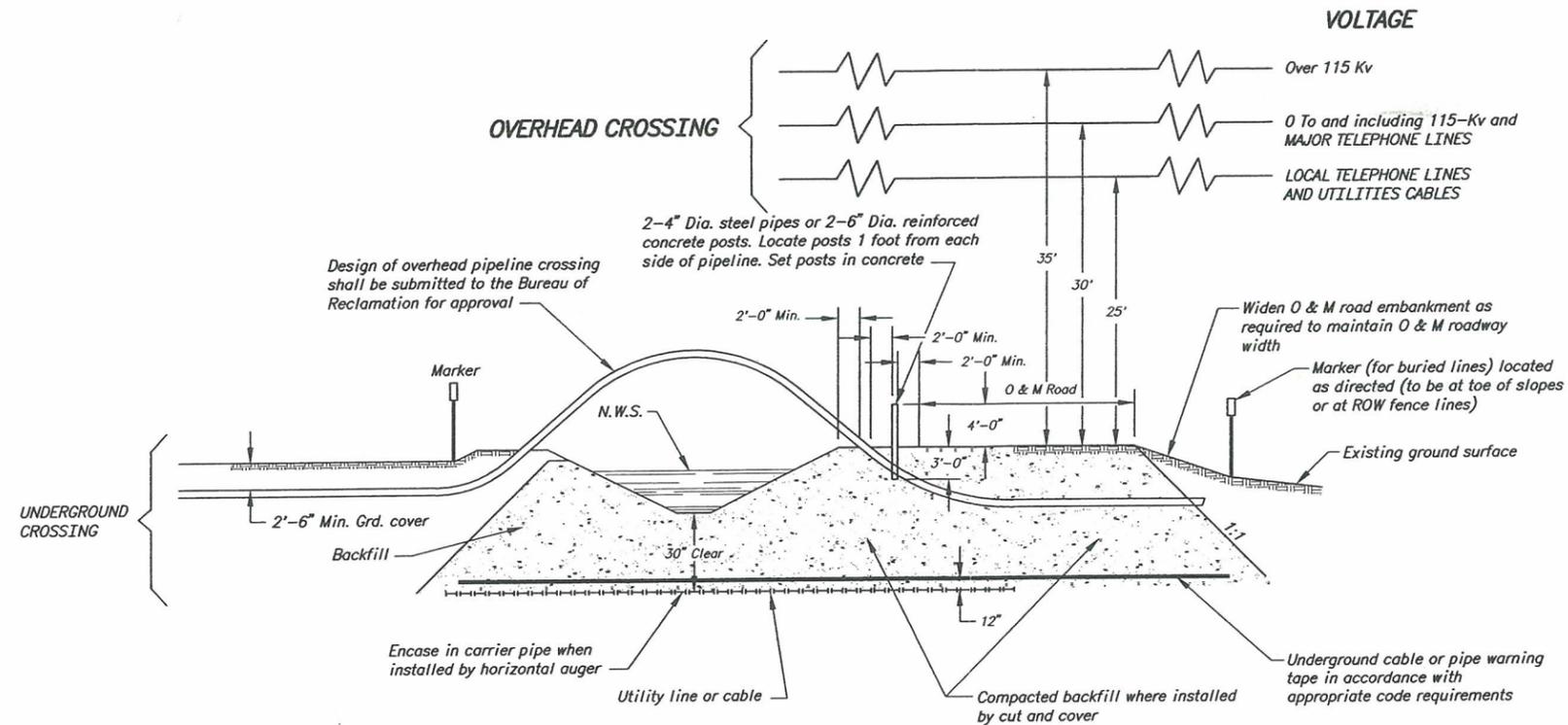
PROJECT NUMBER 2246.022.08  
SHEET NUMBER 73  
DRAWING NUMBER CP-1

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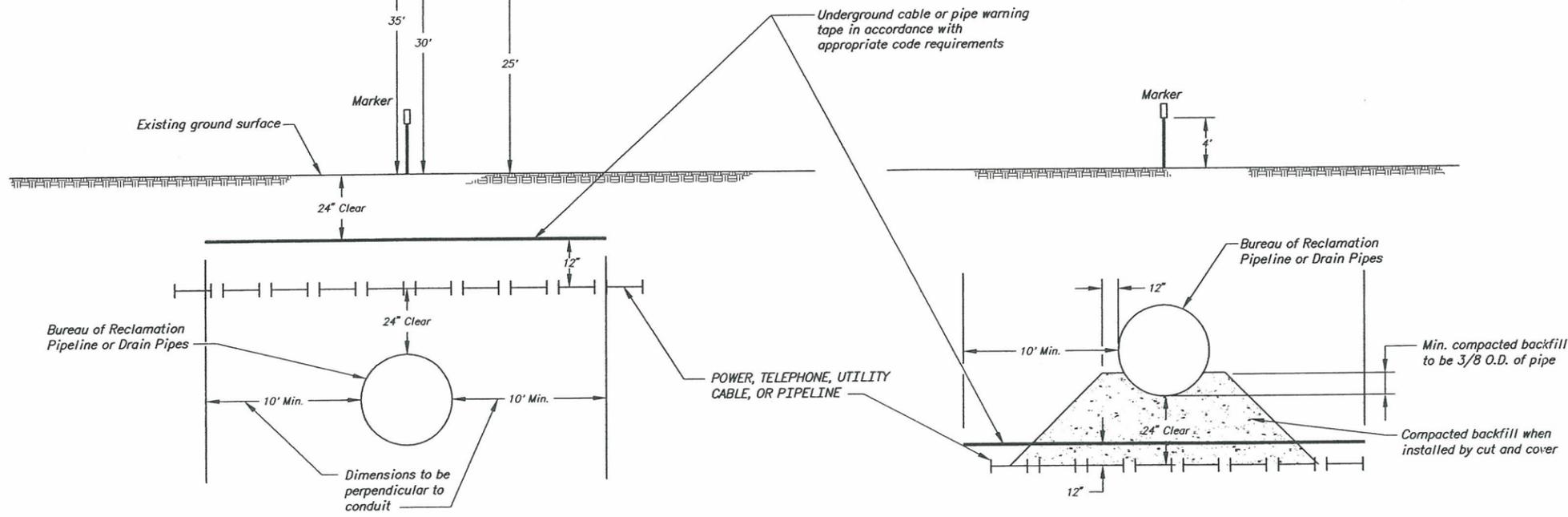
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B

A



UNDERGROUND CROSSING



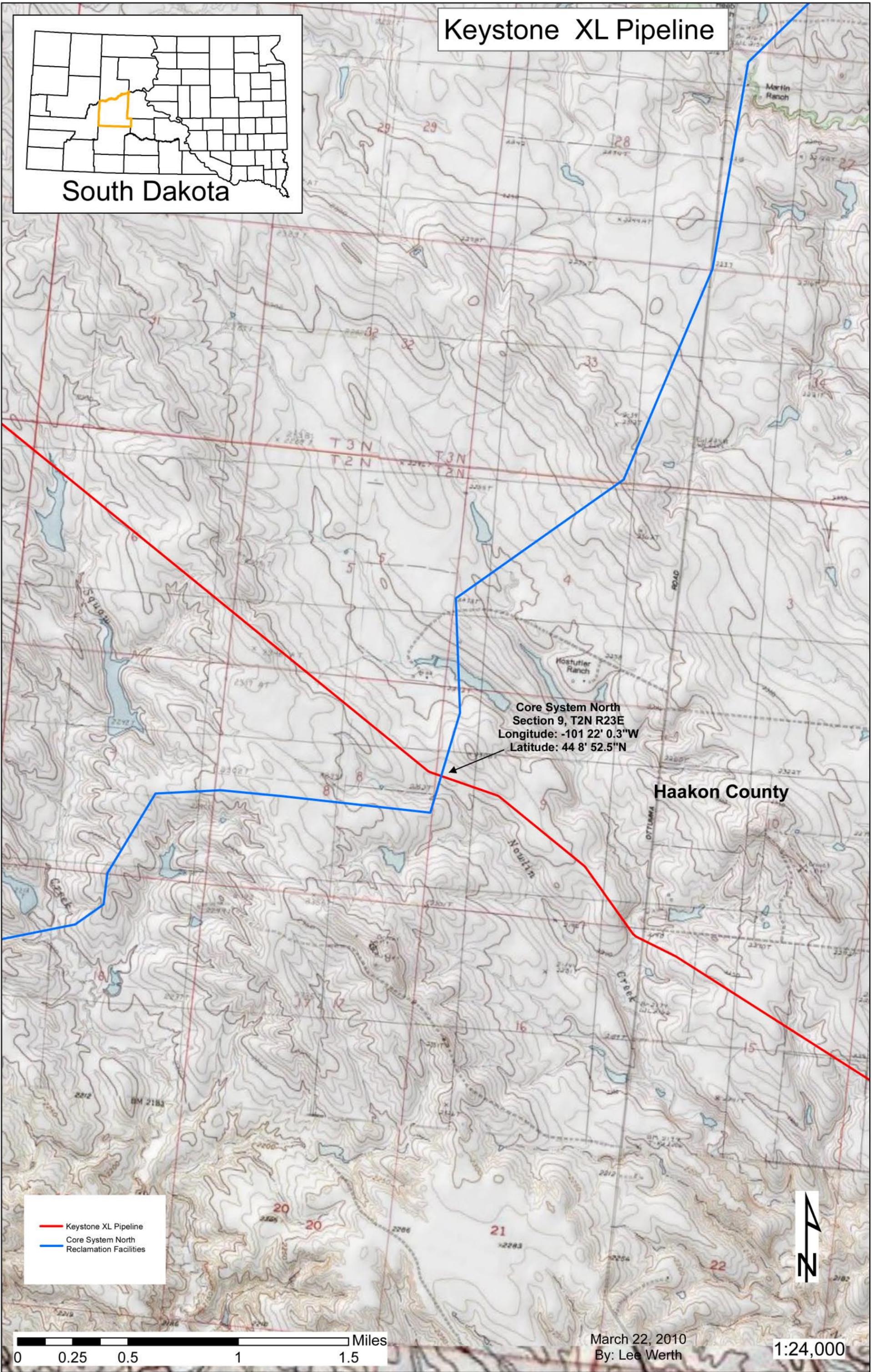
CROSSING PLAN

NOTES

1. Drawing is not to scale.
2. Overhead crossing clearances are minimum for all conditions.
3. Any additional clearances or permits required for construction shall be provided by the Contractor.
4. Conductor clearance shown is for 60° F and final unlocked sag.

REV NO 1	03/14/2002 600- L.K.L., P.E.	REDRAWN AND REVISED
ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION PICK-SLOAN MISSOURI BASIN PROGRAM		
<b>STANDARD CROSSING &amp; CLEARANCE REQ.</b>		
<b>UTILITY LINES AND CABLES</b>		
DESIGNED BY D. ARBUHNOT	TECH. APPROVAL BY S. SHUMMOTO	
DRAWN BY J. POLTRA	SUBMITTED BY D. ARBUHNOT	
CHECKED BY D. ARBUHNOT	APPROVED BY J. M. VERZULI	
CADD SYSTEM AutoCAD	CADD FILENAME 000008LY	DATE AND TIME PLOTTED 03/15/02
BILLINGS, MONTANA	SHEET 1 OF 1	40-600-51

# Keystone XL Pipeline



Core System North  
Section 9, T2N R23E  
Longitude: -101 22' 0.3"W  
Latitude: 44 8' 52.5"N

Haakon County

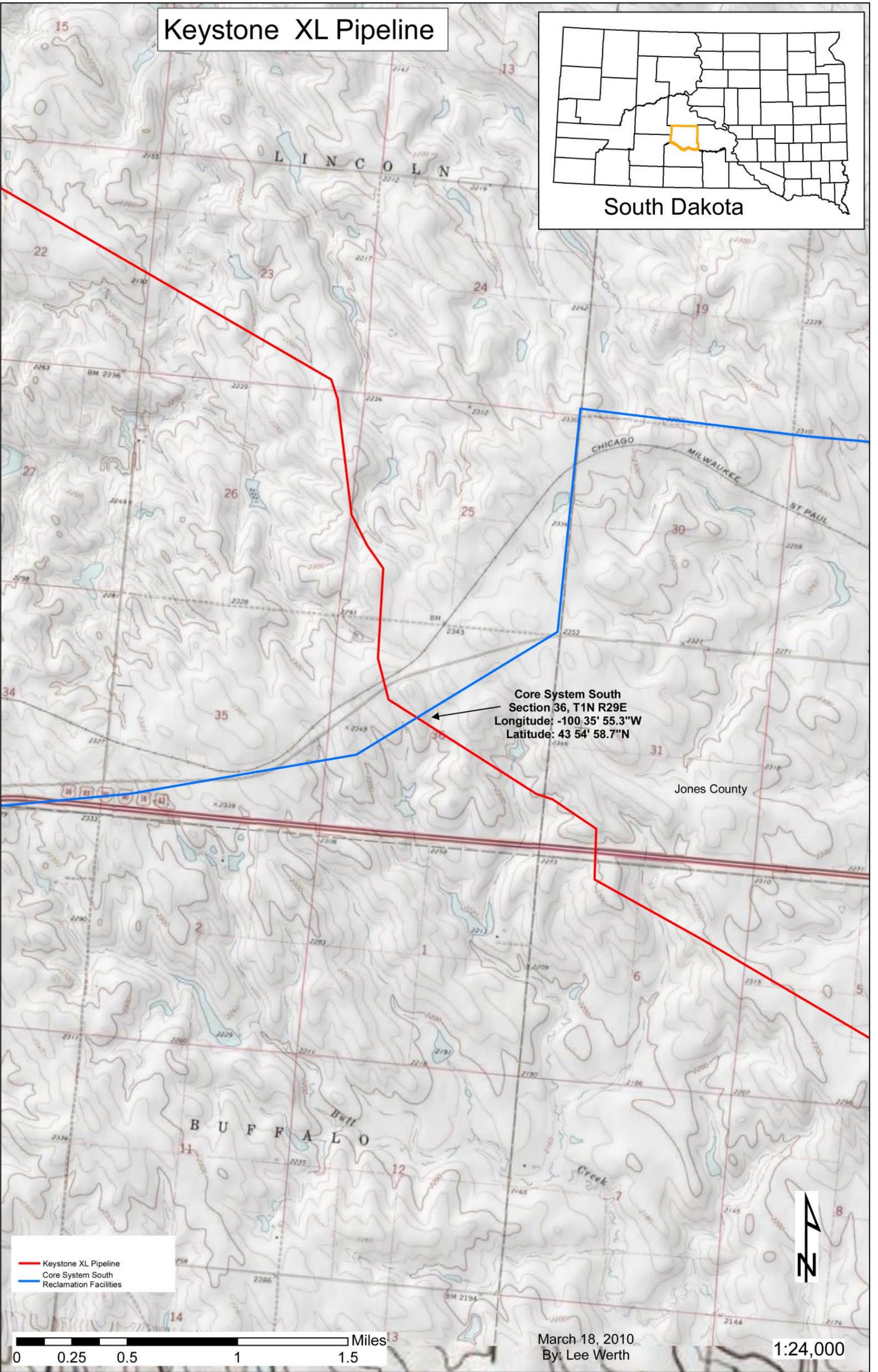
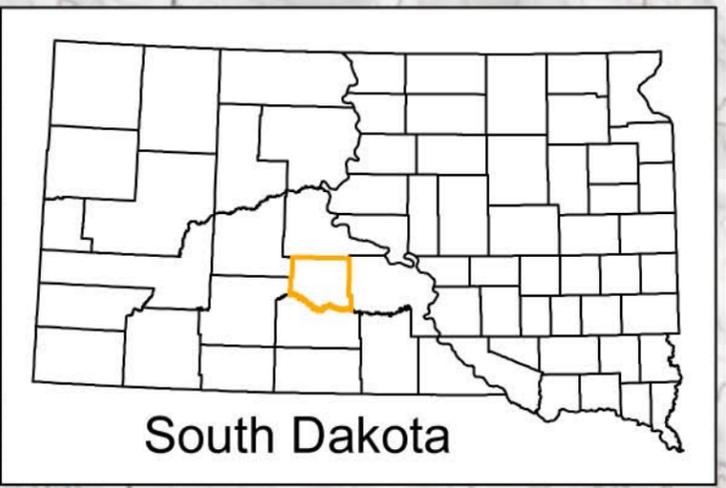
— Keystone XL Pipeline  
— Core System North Reclamation Facilities

0 0.25 0.5 1 1.5 Miles

March 22, 2010  
By: Lee Werth

1:24,000

# Keystone XL Pipeline



— Keystone XL Pipeline  
— Core System South  
— Reclamation Facilities



March 18, 2010  
By: Lee Werth

1:24,000



## **Irrigation Crossings**

## **General Requirements**

## Utility Crossing Reclamation's Canal

Utility crossings include open ditch laterals, subsurface and surface drains, levees, and similar facilities.

### General Requirements:

1. Utilities crossing Reclamation canals should be designed to cross perpendicular (between 70 and 90 degrees).
2. Pier construction in the canal for new utility crossings will not be allowed. New utility crossings will be free span design.
3. Open cut crossings of reclamation canals and ditches, when allowed, require replacing linings to re-establish the original construction style and materials (i.e., disturbed concrete lining panels will be removed in their entirety and replaced, membrane lining and earth or concrete protective cover will be re-constructed, gravel and canal under-drainage systems will be re-established to full working order, etc.) Proposed methods of construction will be prepared and provided for approval.
4. For backfill/compaction requirements, refer to Section 02302 – Compacting Earth Materials.
5. Boring and jacking of a utility will constructed through the embankment foundation materials. Boring and jacking of a utility through canal embankments or protective levees will not be permitted. Applicants will make special design and construction considerations with bored crossings under canals containing water during construction. Among these will be using proper bentonite slurry to seal the annular space between the utility conduit and the boring cavity from canal seepage.

The applicant's drilling plan will cover:

- a. Drilling methods and equipment.
- b. Methods for preserving existing foundation material.
- c. Methods and equipment to determine the presence of quick soil conditions or scouring and caving.
- d. Proposed method for installation and removal if casings are used.
- e. Methods and equipment for accurately determining the depth of concrete and actual or theoretical volume placed.

The applicant's contingency plan will cover:

- a. Means to repair facilities.
- b. Minimum flows after an event.
- c. Review of geotechnical conditions.
- d. Assessment of how the proposed mitigations will address geotechnical conditions.
- e. Methods of restoring foundation materials.

- f. List of material, equipment, and personnel with qualifications to be used during mitigation work.
  - g. A seal from a Professional Engineer on all relevant plans and drawings.
6. When horizontal directional drilling (HDD) or other trenchless methods are used, canal seepage conditions may be aggravated by the collapse of the canal foundation material into the annular void between the bore and pipe. Penetration through the top stratum of fine-grained materials may concentrate seepage at those locations. Pipe installed with trenchless methods shall proceed only after completion of a comprehensive evaluation of the following:
- a. Comprehensive understanding of the subsurface soil and groundwater conditions to a minimum depth of 20 feet below the lowest pipe elevation.
  - b. Locations of the HDD pipe penetration entry and exit.
  - c. Construction procedures.
  - d. Allowable uplift pressures.
  - e. Onsite quality control and quality assurance monitoring during construction operations.
  - f. Grouting of the pipe annulus.
  - g. Backfilling of any excavated areas.
  - h. Repair and reinstatement of the construction staging areas.

A geotechnical report will be submitted with the application for review prior of the proposed utility crossing.

- 7. Cut and cover constructed utilities under Reclamation canals shall be in accordance with drawing 40-600-51.
- 8. Reclamation's ongoing O&M activities will not be disturbed during crossing construction. The primary or secondary operating roads shall be kept available for Reclamation use at all times.
- 9. Canal embankments will be re-built or repaired with materials and standards equal to or better than the existing embankments.
- 10. Disturbed areas shall be reseeded in accordance with Section 02924 – Seeding and Soil Supplements.
- 11. Drawings will be stamped and signed by a Professional Engineer and contain the following information:
  - a. Canal milepost or station at each proposed crossing, utility size and location, and type of utility or material transported.
  - b. Maximum utility operating pressure, type of pipe, joints, wall thickness, maximum test pressure, and description of test procedures.
  - c. Type of sleeve/casing (when allowed) including diameter, joints, and wall thickness.

- d. For utilities attached to a bridge or an overchute, details showing the structure name, superstructure, abutments, spacing or utility supports on the structure, location of other attached utilities, and structural calculations.
- e. Protective coatings and corrosion control measures.
- f. Method of handling pipeline expansion and contraction.
- g. Location of the nearest shutoff valve on each side of the crossing.
- h. Location and details of thrust restraints.
- i. Design code(s) used for the utility crossing.
- j. Location, including depth, of the buried pipeline communication and control cables.
- k. Other existing utility easements in the immediate vicinity.

#### **Hazardous Material Carrier Requirements:**

1. Pipelines carrying hazardous material or pollutants (e.g., oils, gasoline, sewage, contaminated waters, and non-potable waters) will be designed for a reduced risk of failure in the portion within Reclamation's ROW. The design will require either:
  - a. Designing the crossing pipeline with an additional 50 percent working pressure factor or
  - b. Using secondary containment (casing pipe) for all hazardous material pipelines.
2. To minimize the amount of any hazardous material entering the canal, Reclamation may require the installation of a block (gate) valve and or a check valve on each side of the canal between the ROW boundary and the canal prism. When selecting the types of valves, take into account the flow direction and terrain.
3. A final hazardous material spill contingency plan and an emergency response plan shall be approved by Reclamation prior to the start of construction.
4. A monitoring program and/or Supervisory control and Data Acquisition system alarm may be required depending on the hazardous material be transported. This applies to all "overcrossings" and "undercrossings" when the hydraulic grade line is with 60 inches of the canal liner or when geology would promote this requirement.

#### **Utility Crossing Reclamation's Underground Pipelines**

1. The applicant will submit the procedures, excavation plans, schedules, as well as type and weight of the construction equipment to be used for crossing the Reclamation pipeline.
2. For utilities crossing above or under the Reclamation pipeline, the vertical clearance between the utility and the Reclamation pipeline shall be as shown on drawing 40-600-51.
3. The location of the Reclamation pipeline through the proposed construction area shall be shown on the plans. Prior to Reclamation approval of the crossing, the pipeline shall be located and exposed by "potholing." The "pothole" locations shall be shown on the

drawings. Elevations of the existing Reclamation pipeline shall also be shown on the drawings.

4. Drawings shall contain the following:
  - a. Reclamation milepost or stationing at each proposed crossing, pipeline size and location, and type of utility or material transported.
  - b. Maximum utility operating pressure, type of pipe and joints, maximum test pressure and description of test procedures, wall thickness, and utility pipe classification.
  - c. Type of sleeve/casing pipe (when allowed) including diameter, joints, and wall thickness.
  - d. Protective coatings and corrosion control measures.
  - e. Location of nearest shutoff valve on each side of the crossing.
  - f. Location and details of thrust restraint.
  - g. Design code(s) used for utility crossing.
  - h. Location, including depth, of the Reclamation pipeline.
  - i. Other existing utility easements in the immediate vicinity.
  - j. Detectable warning tape will be required over trenched utilities.
  - k. For trench backfill/compaction requirements, see Section 02302 – Compacting Earth Materials.
  - l. Embankments will not be allowed within Reclamation's ROW where underground pipeline exists.
5. Disturbed areas shall be reseeded in accordance with Section 02924 – Seeding and Soil Supplements.