Response to CEC Data Request Set Three: No. 209

Revised Application for Certification (08-AFC-8)

for

HYDROGEN ENERGY CALIFORNIA

Kern County, California

December 2010

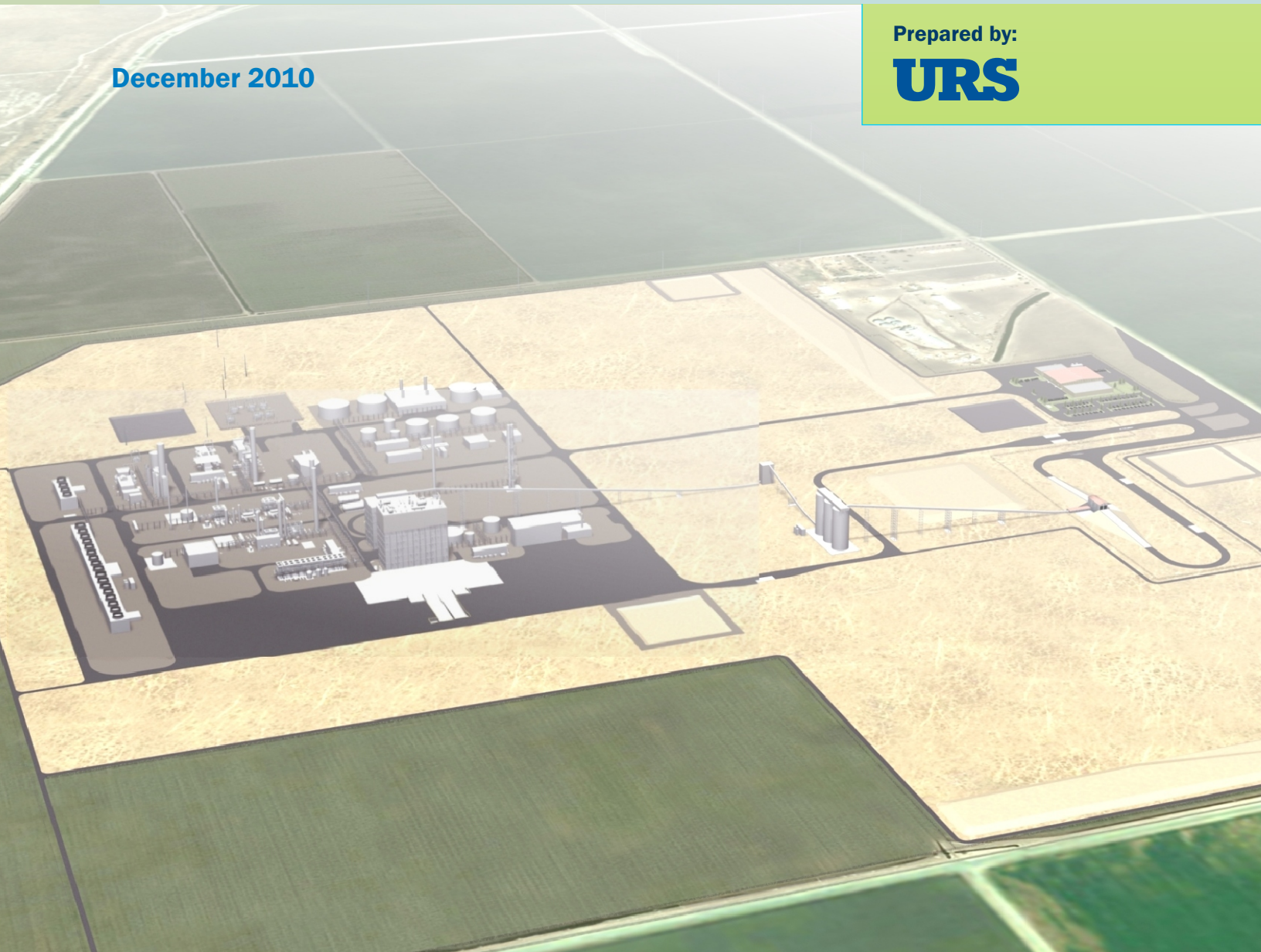
DOCKET
08-AFC-8
DATE RECD. DEC 17 2010

Prepared for:
Hydrogen Energy California LLC

hydrogen energy

Submitted to:
California Energy Commission

Prepared by:
URS



Technical Area: Soil and Water Resources (b)
Authors: Marylou Taylor

BACKGROUND

Horizontal Directional Drilling

Horizontal Directional Drilling (HDD) is proposed in selected areas to install underground pipelines. In response to Energy Commission's Data Request #106, the applicant submitted a "HDD Frac-Out Plan" on December 11, 2009. Staff recognizes that additional risks other than frac-outs are associated with HDD activities, such as soil heaving/settlement from drilling, water disposal from dewatering, erosion from work at entrance/exit pits, and damage/injury from inadvertently boring through existing utilities.

Staff requests a more comprehensive HDD Plan which includes the elements listed below. Note: Final approval of the HDD Plan by staff does not eliminate the need for the applicant to comply with and obtain encroachment permits from appropriate federal, state, and local agencies.

DATA REQUEST

209. Please provide a draft HDD plan that contains elements "A" through "G" below.

A. General description of work
- ***a. major equipment used, pipe materials and pipe sizes***
- ***b. pilot hole drilling procedure, reaming operation, pullback procedure, hydrostatic testing, and dewatering procedures***
- ***c. installation and monitoring of SWPPP facilities and conditions***
- ***d. site restoration plan***

B. Proposed pipe alignment
- ***a. typical layout of entrance/exit pits and staging areas, including distances from public and private properties***
- ***b. locate existing utilities near HDD activities***
- ***c. entry and exit point locations***
- ***d. profile showing angle of entry/exit and depth at every 50(?) feet***
- ***e. locations where pipe crosses roads, irrigation ditches, and the California Aqueduct (include distance between pipe casing and these facilities)***

C. Monitoring procedures
- ***a. pilot hole, reaming, and pullback***
- ***b. unintended frac-outs***
- ***c. ground surface movement (settlement or heave)***

D. Containment and control
- ***a. drilling fluids and additives used***
- ***b. drilling fluids delivery, recovery, and containment***
- ***c. method/location for final disposal of waste drilling fluids***
- ***d. frac-out contingency plan***

E. Hazardous materials contingency plan

F. Abandonment plan
a. during pilot hole drilling
b. during reaming
c. HDD realignment

G. Notification procedures

RESPONSE

A draft Horizontal Directional Drilling plan has been provided as Attachment 209-1.

ATTACHMENT 209-1

DRAFT
Horizontal Directional Drilling Plan

HYDROGEN ENERGY CALIFORNIA

CARBON DIOXIDE AND NATURAL GAS PIPELINES

Kern County, California

December 2010

Prepared By:

URS Corporation

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FIGURES

1.0 INTRODUCTION

Hydrogen Energy California (HECA or the Applicant) will be constructing pipelines in Kern County California that will cross under waterways and transportation systems. Horizontal Directional Drilling (HDD) is planned in some of these selected areas to install underground pipelines that carry carbon dioxide (CO_2) and natural gas.

The work described in this Draft HDD Plan consists of furnishing and installing underground utilities using the HDD method of installation, also commonly referred to as directional boring or guided horizontal boring. This work will include all services, equipment, materials, and labor for the complete and proper installation, testing, and restoration of underground utilities, and environmental protection and restoration. The Applicant will comply with and obtain the necessary encroachment permits from the Department of Water Resources, Caltrans, Buena Vista Water Storage District, and any other appropriate agencies.

HDD technology, which has been in use since about 1970, is a blending of aspects of conventional boring and directional drilling in oil/gas wells. It is now used routinely for the installation of various utility lines across barriers such as rivers and other water bodies, highways, railroads, congested areas, and airport runways. The utility installations have included pipelines for oil, natural gas, and other fluids, as well as ducts or conduits for electric and fiber optic cables. Pipelines with diameters up to 60 inches have been installed using HDD technology. The length and size of the pipe installed depends on site-specific soil conditions as well as current technology and equipment.

This Draft HDD Plan has been developed in the response to the California Energy Commission (CEC) Data Request 209. The Applicant recognizes that risks associated with HDD activities include frac-outs; soil heaving/settlement from drilling; water disposal from dewatering; erosion from work at entrance/exit pits; and damage/injury from inadvertently boring through existing utilities. This plan identifies and describes the measures to be implemented to minimize these risks.

In addition to this Draft HDD Plan, in November 2009 HECA submitted an “HDD Frac-Out Plan” in the response to CEC Data Request 106; information regarding the discharge of hydrostatic test water in the responses to CEC Data Requests 107 and 108; and a description of water use related to HDD in the response to CEC Data Request 101. A description of HDD in the vicinity of biological resources was submitted in June 2010 in the response to CEC Workshop Request 2. Please refer to these documents for additional details.

2.0 GENERAL DESCRIPTION OF WORK

2.1 MAJOR EQUIPMENT

Specific equipment, drilling fluids, and additives to be used in construction of the planned HDD crossings will be supplied prior to work initiation in the form of HDD specifications. Equipment will include, but not be limited to, drilling rig, mud system, mud motors (if applicable), downhole tools, guidance system, and rig safety systems. Calibration records for guidance equipment will also be provided. The directional drilling equipment will consist of a directional drilling rig of sufficient capacity to perform the bore and pull back the pipe; a drilling fluid mixing system; delivery and recovery system of sufficient capacity to successfully complete the crossing; a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused; a guidance system to accurately guide boring operations; a vacuum truck of sufficient capacity to handle the drilling fluid volume; and trained and competent personnel to operate the system. All equipment will be in good, safe operating condition with sufficient supplies,

materials, and spare parts on hand to maintain the equipment in good working order for the duration of the Project.

2.1.1 Drilling System

2.1.1.1 Drilling Rig

The directional drilling rig will consist of a hydraulically powered system to rotate, push, and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The drill head can be steered by changing its rotation, and will provide the necessary cutting surfaces and drilling fluid jets. The rig will be adequately anchored to the ground to withstand the pulling, pushing, and rotating pressure required to complete the crossing, including pullback operations. The hydraulic power system will be self-contained, with sufficient pressure and volume to power drilling operations. The hydraulic system will be free of leaks. The drilling rig will have a system to monitor and record maximum pullback pressure during pullback operations. The rig will be grounded during drilling and pullback operations.

2.1.1.2 Mud Motors (if Required)

Mud motors are positive displacement pumps that are designed to be installed in the drill string, to provide additional power to the drill bit while drilling (if needed). The drilling mud flows through the mud motor, and the pump provides a boost to the drill bit's power. Any mud motor used will be of adequate power to turn the required drilling tools.

2.1.1.3 Drill Pipe

Drill pipe will consist of high tensile strength carbon steel tubing fitted with threaded end connections to allow continued extension of the boring apparatus. The specific pipe size, wall thickness, and material makeup will be selected based on the final HDD design.

2.1.2 Guidance System

A Magnetic Guidance System or a proven gyroscopic system will be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance will be capable of tracking at all depths up to 100 feet below the surface and in any soil condition, including hard rock. It will enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction).

The guidance system will be of a proven type and will be operated by personnel trained and experienced with this system. The Operator will be aware of any magnetic anomalies on the surface of the drill path and will consider such influences in the operation of the guidance system if using a magnetic system.

2.1.3 Drilling Fluid (Mud) System

2.1.3.1 Mixing System

A self-contained, closed, drilling fluid mixing system will be of sufficient size to mix and deliver drilling fluid. The mixing system will continually agitate the drilling fluid during drilling operations.

2.1.3.2 Mud Delivery System

The mud pumping system will have sufficient capacity and be capable of delivering the drilling fluid at a constant minimum pressure. The capacity and pressure will be defined within the HDD specifications. The delivery system will have filters in-line to prevent solids from being pumped into the drill pipe. Proper connections between the pump and drill pipe will minimize leaks. Used drilling fluid and drilling fluid spilled during drilling operations will be contained and conveyed to the drilling fluid recycling system. All leaks will be documented and reported immediately to the environmental monitor for appropriate handling.

2.1.3.3 Drilling Fluid Recycling System

The drilling fluid recycling system will separate sand, dirt, and other solids from the drilling fluid to render the drilling fluid reusable.

2.1.4 Other Equipment

2.1.4.1 Pipe Rollers

Pipe rollers will be of sufficient size to fully support the weight of the installed pipe while being hydrotested and during pullback operations. A sufficient number of rollers will used to prevent excess sagging of pipe.

2.1.4.2 Pipe Rammers (if required)

Hydraulic or pneumatic pipe rammers may be used, if necessary, to help free stuck pipe, overcome hydrolock, or reduce stress levels during pullback operations. Rams may also be used to install a casing at the drill entry to provide a cleaner bore start.

2.1.4.3 Pipe

The 12-inch-diameter CO_2 pipeline will be steel pipe, probably API 5L, PSL2 specification. The grade of the pipe will likely be X60 or higher. This pipeline is expected to have a maximum operating pressure of less than 3,000 pounds per square inch (psi). Additional piping specifications will be determined during detailed engineering design. The 16-inch-diameter natural gas pipeline will also be steel pipe, again likely API 5L, PSL2 specification. This pipeline is expected to have an operating pressure between 300 and 600 psi. The material grade for this pipe has not yet been selected. Reasonable wall thicknesses (in the range of 0.375 inch) can be obtained for this pressure rating with grade B or X-42 material. Pipe for the HDD will be welded together in one length, if space permits, with welds X-rayed prior to being placed in the borehole. As necessary, the HDD will be accomplished with two courses. Pipe will be placed on pipe rollers before pulling into the borehole, with rollers spaced close enough to prevent excessive sagging of pipe.

2.2 HDD OPERATION AND PROCEDURES

2.2.1 Site Preparation

Prior to the start of ground-disturbing activities, work sites and the construction right-of-way (ROW) will be identified on drawings. Work sites will be graded to provide a level working area. No ground disturbance or alterations are to be made, beyond what is required for HDD operations or other pipeline activity. All activities will be confined to the designated work areas.

2.2.2 Utility Locating

To avoid existing utilities, a “one call” utility location service will be used prior to identifying the drill path. If, after initiating the “one call” process, there are known facilities in the area that have not been marked, the owner/operator of the facilities will be contacted to mark their facility. The drill path will be modified, as needed, to prevent damage to existing facilities.

2.2.3 Pilot Hole Drilling Procedure

The pilot hole will be drilled on the bore path with no deviations greater than 5 percent of depth over a length of 100 feet, unless defined otherwise within the HDD specifications or plan. In the event that the pilot does deviate from the bore path by more than 5 percent of depth in 100 feet, the specific conditions will be evaluated and, if warranted, the bore will be pulled back and redrilled from a point before the deviation. If a drilling fluid fracture, inadvertent returns, or returns loss occurs during pilot hole drilling operations, drilling will be halted until the fracture can be sealed using higher-viscosity drilling fluid. The process for sealing such fractures will be to wait at least 30 minutes after stopping the drill; inject a fluid with a higher viscosity and then wait another 30 minutes before continuing with the operation.

If the mud fracture or return loss continues, operations will again be halted while the problem is evaluated. Depending on the specific conditions, additional attempts to seal the fracture will be made. As a last resort, the bore will be abandoned in accordance with Section 7.0 of this Draft HDD Plan.

2.2.4 Reaming

Upon successful completion of the pilot hole, boreholes will be reamed, using the appropriate tools, to a minimum diameter of 25 percent greater than the outside diameter of pipe to be installed. The amount of reaming at one time will be limited to no more than the capacity of the drilling equipment and mud system.

2.2.5 Pullback

After successfully reaming the borehole to the required diameter, the pipe will be pulled through the borehole. In front of the pipe will be a swivel and reamer to compact the borehole walls. Once they have commenced, pullback operations must continue without interruption until the pipe is completely pulled into borehole. During pullback operations, the pull pressure will be less than or equal to the maximum safe limit, as defined in the HDD specifications or plan. If pull progress stops, pulling operations will be halted to allow any potential hydrolock to subside before continuing. If progress remains impeded, operations will again be halted while the problem is evaluated. Depending on the specific conditions, additional attempts to allow the hydrolock to subside will be made. As a last resort, the bore will be abandoned in accordance with Section 7.0 of this Draft HDD Plan.

2.2.6 Hydrostatic Testing

As previously described in the response to CEC Data Request 101, the source of water for the hydrostatic testing will be potable water from West Kern Water District.

Following successful pullback of the pipe, the installed pipe will be strength tested using pressurized water for a period of 8 hours. All testing will be performed in accordance with U.S. Department of Transportation regulations outlined in 49 Code of Federal Regulations (CFR) Part 192/ASME B31.8 (Natural Gas pipeline) or 49 CFR Part 195/ASME B31.4 (CO_2

pipeline), as appropriate. A calibrated pressure recorder will be used to record the pressure during the test period.

2.2.7 Dewatering Procedures

As previously described in the response to CEC Data Request 107, if the duration of the discharge of the hydrostatic test water is more than a few weeks, then the Applicant will acquire the necessary approvals to comply with the State Water Resources Control Board's Water Quality Order No. 2003-0003-DWQ, which includes low threat discharges to land from hydrostatic testing. Alternatively, the hydrostatic test water could be discharged to one of the local canals in accordance with the Central Valley Regional Water Quality Control Board's General Order No. R5-2008-081, which includes low threat discharges to surface water from hydrostatic testing.

Upon successful completion of hydrotest, the test water will be discharged through appropriate filters and energy-dissipating devices, if needed, in compliance with the appropriate permit requirements. Hydrotesting will be conducted consistent with the details provided in the responses to CEC Data Requests Set 1, Nos. 107 and 108.

2.3 STORM WATER POLLUTION PREVENTION PLAN

A Storm Water Pollution Prevention Plan (SWPPP) will be prepared in accordance with the requirements of the General Permit for Discharges of Storm Water Associated with Construction Activity Order 2009-0009-DWQ. The HDD will comply with the requirements of the General Permit for Discharges of Storm Water Associated with Construction Activity Order 2009-0009-DWQ, as appropriate.

There are no water bodies in the vicinity of the Project that are listed on the 303(d) list for sediment; therefore, a sediment monitoring plan would not be required. The SWPPP will be available on site during all construction and restoration phases of the Project.

During construction, the measures described in the SWPPP will be implemented to prevent erosion and to salvage topsoil and seed banks.

2.4 SITE RESTORATION

Following drilling operations, equipment will be demobilized and the work-site will be returned to preconstruction conditions in accordance with Project and regulatory requirements. All excavations will be backfilled, compacted, and revegetated with native seed.

3.0 PROPOSED PIPE ALIGNMENT

3.1 CROSSING OF CALIFORNIA AQUEDUCT

This crossing, shown on Figure 2, is for the 12-inch CO_2 pipeline. The line runs predominantly north to south from the HECA Project Site, and crosses the West Side Canal, the Kern River Flood Control Channel, and the California Aqueduct, respectively. The overall length of this HDD crossing is 3,700 feet. The profile of the drill is such that the preliminarily estimated depth under the bottom of the California Aqueduct will be 40 feet.

3.2 CROSSING OF EAST SIDE CANAL

This crossing, shown on Figure 3, is for the 16-inch natural gas pipeline. The total length of the HDD crossing is about 415 feet, and the drill will be made from west to east so the pipeline ROW going east can be used to stage the pull string. The entry site area extends west of the pipeline construction ROW because the pipeline turns from northbound to eastbound at this point.

3.3 CROSSING OF HIGHWAY I-5

Figure 4 illustrates the crossing of Interstate-5 (I-5) for the natural gas pipeline. This HDD crossing is approximately 462 feet long, and the drill will be made from west to east so the pipeline construction ROW can be used to stage the pull string. The exit site area will extend east of the pipeline, and the entry site area extends west of the pipeline.

3.4 CROSSING OF STATE HIGHWAY 58 AND RAILAMERICA RAIL ROAD

This crossing for the natural gas pipeline is depicted in Figure 5. This drill is anticipated to go from south to north and cross first the railroad, then State Highway 58, and then Brandt Road. The pipeline construction ROW going north will be used to stage the pull string. The total length of the HDD crossing is 443 feet.

3.5 TYPICAL LAYOUT

Typical work sites for HDD crossings are 100 feet by 200 feet in size and are usually set up as shown in Figures 1, 6, and 7. The specific layout for each of the Project HDD sites will be determined by the final design for construction.

3.6 LOCATIONS AND DEPTHS OF CROSSINGS

Preliminary plan view, location, and profile drawings are attached. These drawings are subject to change as designs are finalized (e.g., as crossing angles are refined).

The 12-inch-diameter CO_2 pipeline crosses under the California Aqueduct, Kern River Flood Control Channel, and the West Side Canal. The HDD crossing is approximately 3,700 feet in length and is preliminarily estimated to achieve a depth of about 40 feet below the bottom of the aqueduct.

The remaining three crossings are for the 16-inch-diameter natural gas pipeline under the East Side Canal, I-5, Highway 58, and the RailAmerica Railroad. The HDD crossing under the East Side Canal is approximately 415 feet in length and is preliminarily estimated to achieve a depth of 10 feet below the canal. The HDD crossing under I-5 is approximately 462 feet in length and is preliminarily estimated to achieve a depth of 15 feet. The HDD crossing under Highway 58 and the RailAmerica Railroad is approximately 443 feet in length and is preliminarily estimated to achieve a depth of 10 feet.

4.0 MONITORING PROCEDURES

4.1 PILOT HOLE, REAMING, AND PULLBACK

The bore will be covered with a Tru Tracker coil that will enable verification of the hole location at every survey point under the coil. If at any point the coil shows the alignment to be unacceptable, the drill pipe will be pulled back to an acceptable point to redirect the hole. Grout

will be pumped into the abandoned section of the hole; after allowing the grout to set, the hole will be redirected to stay within acceptable limits.

4.2 UNINTENDED FRAC-OUT

Fluid recovery will be monitored on a continuous, or near continuous basis. Plugging of the borehole annulus or the presence of a major formation fracture will typically lead to partial or full loss of drilling fluid circulation. Fluid loss will be monitored by watching for significant differences between the fluid rate being pumped downhole and the rate of returns flowing into the surface containment pits. The drill pipe will be monitored for the presence of backpressure when unscrewing from the downhole work string, because this is an indicator of a plugged annulus, which could lead to a frac-out. The drilling fluid pump rate and solids control tank level will also be monitored. If fluid circulation becomes slowed, or if back pressure in the string is present, the following procedure will be implemented:

1. Temporarily cease drilling operations and shut off the mud pumps.

2. Dispatch observers, as required, to monitor the area along the bore alignment.

3. If no drilling fluids are seen on the ground surface, start mud pumps and gradually increase volumes as the drill pipe is pulled back, to wipe the borehole annulus and encourage flow.

It should be noted that drill cuttings generated as a result of the drilling process will often naturally bridge and subsequently seal fractures or voids in the formation as drilling progresses, thus providing another means to reestablish lost circulation. This is particularly likely during the reaming process as higher volumes of cuttings are being generated.

4.3 GROUND SURFACE MOVEMENT (SETTLEMENT OR HEAVE)

Surveying and visual monitoring will be performed during drilling operations to determine current conditions, determine the integrity of the element being crossed, and verify that no damage has occurred. Survey points will be installed along the intended route in the vicinity of the HDD to facilitate monitoring periodically during drilling.

If excessive ground surface settlement is observed, drilling operations would be stopped immediately and appropriate notifications would be made, as described in Section 8.0 of this Draft HDD Plan. After notification, all affected personnel would make a determination of the appropriate action to be taken. Any action would only be taken after approval.

5.0 CONTAINMENT AND CONTROL

5.1 DRILLING FLUIDS

Drilling fluid will be composed of clean water and appropriate clay additives, and will be fully specified in the HDD specifications. Water will be from a source with an acceptable pH level. Water of a lower pH or with excessive calcium will be treated with the appropriate amount of sodium carbonate or equivalent. The water and additives will be mixed thoroughly and will be absent of any clumps or clods. No material will be used in drilling fluid that is considered hazardous or may pose a threat to the aquatic system and/or wildlife.

5.2 DRILLING FLUIDS DELIVERY, RECOVERY, AND CONTAINMENT

5.2.1 Delivery

The mud pumping system will have sufficient capacity and be capable of delivering the drilling fluid at a constant minimum pressure. Filters will be in place to keep solids from being pumped into the drill pipe.

5.2.2 Recovery

Drilling mud is circulated through the drill pipe and returned to the settlement pit in the entry pit site. Used drilling fluids and any drilling fluids spilled during the drilling operation will be contained and returned to the drilling fluid recovery system.

5.2.3 Containment

A berm of sufficient height will be maintained around drill rigs, the drilling fluid mixing system, entry and exit points, and the drilling fluid recycling system to prevent spills into the surrounding environment. Pumps and or vacuum truck(s) of sufficient size will be in place to convey excess drilling fluid from containment areas to storage and recycling facilities.

To prevent migration from the fracture location, drilling fluid will be contained with sand or gravel bags, straw bales, and/or wattles, or a pre-made containment vessel made of steel.

Where possible and if needed, a small sump pit will be excavated at any fracture location to provide a means for the fluid to be returned to either the drilling site for cleaning and reuse or to an approved dump site (i.e., vacuum trucks, pumps, or both).

Containment, response, and cleanup equipment will be available at both sides of the HDD crossing location. This equipment will include, but will not necessarily be limited to, the following:

- straw bales
- silt fencing
- plastic sheeting
- mud pumps and hose
- mud storage tanks
- vacuum truck

5.3 METHOD/LOCATION FOR DISPOSAL WASTE

The Applicant will identify a suitable and approved disposal site for the spent drilling fluids and other waste materials. Drilling waste will consist primarily of drilling cuttings and used mud. The used drilling mud and the drilling cuttings will be collected in an earthen pit next to the drilling rig. Drilling cuttings and used mud will be sampled and characterized and, if they are determined to be nonhazardous, will be transported by truck to a county permitted disposal site after the drilling operations are completed. There are no hazardous chemicals in the proposed drilling mud.

6.0 HAZARDOUS MATERIALS CONTINGENCY PLAN

The Applicant will comply with the applicable terms and conditions from all federal, state, and county regulatory agencies regarding environmental protection. Prior to implementing the HDD activities, a Hazardous Materials Contingency Plan will be developed to specify the regulatory framework that would govern unplanned encounters with hazardous materials, such as the discovery of previously-contaminated soil, striking an existing subsurface pipeline that was not detected during pre-work planning, or utility location.

The Hazardous Materials Contingency Plan would also describe the measures to be implemented to prevent the unplanned release of hazardous materials (i.e., fuel and hydraulic fluid for vehicles and construction equipment) during the HDD activities. These terms and conditions include, but are not limited to, the following measures:

- Silt fencing will be placed between all drilling operations and any drainage, wetland, waterway, or other area designated for such protection by contract documents, state, federal, and local regulations. Additional environmental protection necessary to contain any hydraulic fluid spills will be put in place, including berms, liners, turbidity curtains, and other measures. Fuel will not be stored in bulk containers within 100 feet of any water body or wetland. Vehicles will not be refueled or parked overnight within 100 feet of any water body or wetland.

- Environmental Monitors will be identified for the Project during construction and restoration. The number and experience of Environmental Monitors assigned to the Project will be appropriate for the number/significance of resources affected. Environmental Monitors will have the authority to stop activities that violate the environmental conditions of county, state, and Federal environmental permit conditions, or landowner requirements, and to order appropriate corrective action.

7.0 ABANDONMENT PLAN

While every precaution will be taken during design, construction preparation, and drilling operations, conditions may arise which could require the planned path to be redirected or abandoned. This would include a utility strike, extremely hard rock, or excessive deviation from the intended drill path.

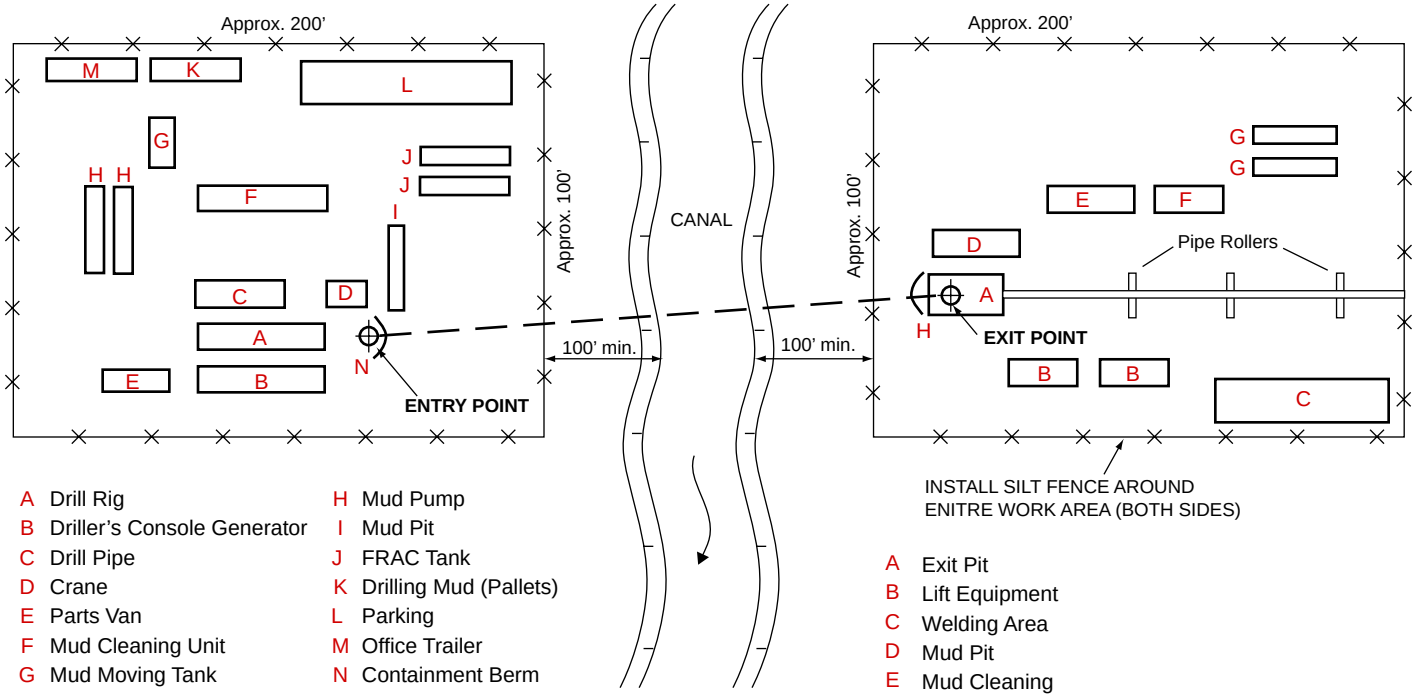
If the drill string encounters an obstruction that stops progress, drilling will be suspended until the likely nature of the obstruction can be determined. This determination will be made taking into consideration the plotted locations of the bit, the presence (or lack of) magnetic interference as monitored by the steering tool, and analysis of mud returns (for wood, etc.). If it is determined that the obstruction is something that can and should be drilled through, a different bottom hole assembly could be used, such as a mud motor. If it is determined that the obstruction is something that cannot or should not be drilled through, an alternative drill path design will be made and submitted to the Applicant for approval. The drill bit will be retracted to a point that would allow the necessary deviation, and drilling would resume on the new course.

8.0 NOTIFICATION PROCEDURE

Conditions encountered that necessitate deviation from this plan may require agency notification. HDD specifications will include a notification matrix and specific sequence of

notifications to be completed, from the construction crews through appropriate agencies considering the final HDD designs. All of the following would be notified immediately:

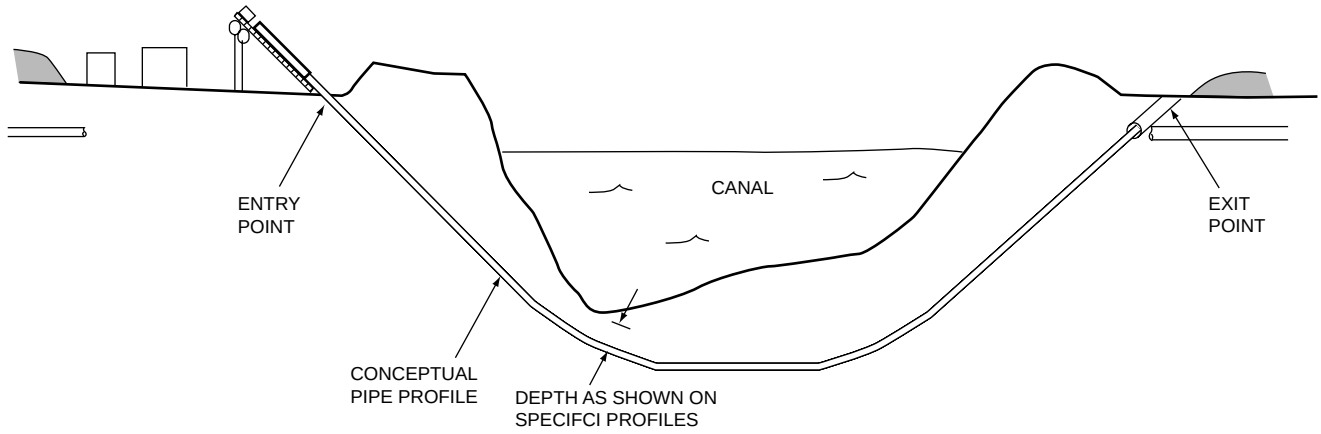
- Project site inspector
- Project representative(s)
- Representative(s) from Kern County, as appropriate
- Representative(s) from Department of Water Resources, as appropriate
- Representative(s) from US Army Corps of Engineers, as appropriate
- Representative(s) from Central Valley Flood Plain Authority, as appropriate



A Drill Rig
B Driller's Console Generator
C Drill Pipe
D Crane
E Parts Van
F Mud Cleaning Unit
G Mud Moving Tank
H Mud Pump
I Mud Pit
J FRAC Tank
K Drilling Mud (Pallets)
L Parking
M Office Trailer
N Containment Berm

A Exit Pit
B Lift Equipment
C Welding Area
D Mud Pit
E Mud Cleaning
F Generator
G FRAC Tank
H Containment Berm

PLAN



PROFILE

Schematic only; not to scale

NOTES:

1. Drilling equipment will be set back a minimum of 100 feet from the edge of the canal. No clearing or grading will occur within the 100-foot zone.
2. Only bentonite based drilling mud will be used. The use of any additives to the drilling mud will not occur without the aproval of HECA's representative.
3. Suitable drilling mud tanks or sumps will be installed to prevent contamination of the canal.
4. Berms will be installed downslope from the drill entry and anticipated exit points to contain any release of drilling mud.
5. Drilling mud will be disposed of in accordance with the appopriate regulatory agency requirements.

TYPICAL HDD CROSSING

December 2010 Hydrogen Energy California (HECA)
28067571 Kern County, California

URS

FIGURE 1

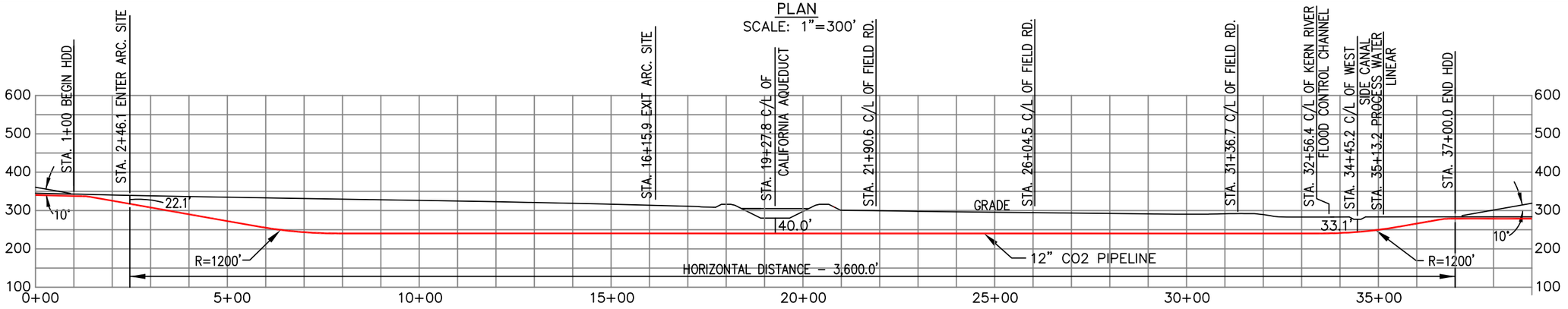
12/02/10 vsa..T:\HECA\GRAPHICS\Data Requests\HDD Plan\Fig 1_typ HDD crossing.ai

STA. 0+00.0 P.I. 4°04'55" RT.
STA. 1+00 BEGIN HDD
STA. 2+46.1 ENTER ARC. SITE
STA. 11+07.0 SECTION LINE
STA. 16+15.9 EXIT ARC. SITE
STA. 16+92.9 AQUEDUCT BOUNDARY
STA. 19+27.8 C/L OF CALIFORNIA AQUEDUCT
STA. 21+91.1 AQUEDUCT BOUNDARY
STA. 21+90.6 C/L OF FIELD ROAD
STA. 26+04.5 C/L OF FIELD ROAD
STA. 31+36.7 OF FIELD ROAD
STA. 31+41.6 FLOOD CONTROL CHANNEL BOUNDARY
STA. 32+56.4 C/L OF KERN RIVER FLOOD CONTROL CHANNEL
STA. 33+71.3 FLOOD CONTROL CHANNEL BOUNDARY
STA. 34+06.6 CANAL BOUNDARY
STA. 34+45.2 C/L OF WEST SIDE CANAL
STA. 34+79.9 SECTION LINE
STA. 34+90.8 CANAL BOUNDARY
STA. 35+13.2 PROCESS WATER LINEAR
STA. 37+00.0 END HDD
STA. 37+08.2 P.I. 37°10'08" RT.

KERN COUNTY, CALIFORNIA
T30S - R24E

PRIVATE PROPERTY
ARCHEOLOGICAL SITE #125
CONFIDENTIAL
PUBLIC PROPERTY
SECTION 16
PUBLIC PROPERTY
PROCESS WATER LINEAR
SECTION 9
N
100' x 200' T.U.A.
HDD ENTRY POINT
12" CO2 PIPELINE
100' x 200' T.U.A.
HDD EXIT POINT
0+00
5+00
10+00
15+00
20+00
25+00
30+00
35+00
40+00
1,583'±
300'±
50' WIDE CONSTRUCTION R.O.W. (SEE FIGURE 6)
25' WIDE PERMANENT R.O.W.
CALIFORNIA AQUEDUCT
SECTION 15
PRIVATE PROPERTY
KERN RIVER FLOOD CONTROL CHANNEL
WEST SIDE CANAL
SECTION 10
PRIVATE PROPERTY
50' WIDE CONSTRUCTION R.O.W. SEE FIGURE 6

PLAN
SCALE: 1"=300'



PROFILE
SCALE: 1"=300'

LEGEND

- T.U.A. – TEMPORARY USE AREA (INCLUDES ENTRY/EXIT PITS)
- C/L OF WATER BODY
- C/L OF ROAD
- SECTION LINE
- PROCESS WATER LINEAR
- 12" CO2 PIPELINE
- PERMANENT R.O.W.
- CONSTRUCTION R.O.W.

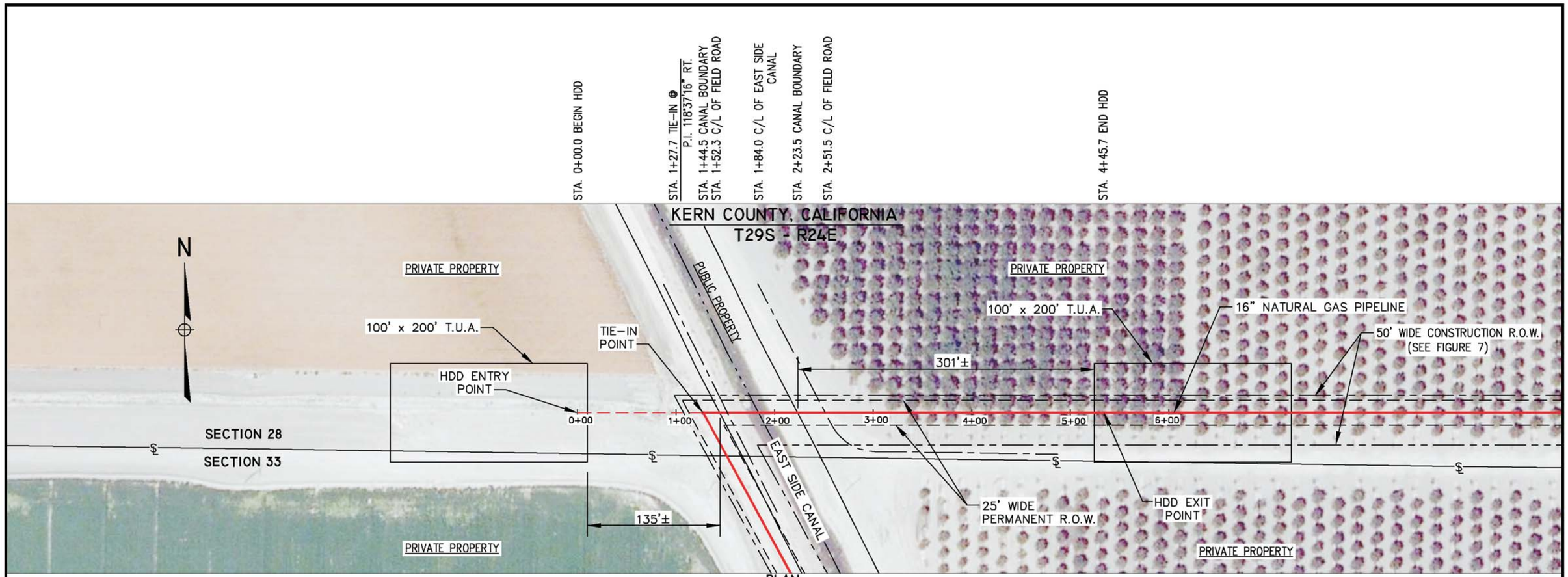
REFERENCE DRAWINGS		REVISIONS					DRAWING APPROVAL	
							DATE	APPV'D BY
							CLIENT	
							PROJECT MGMT.	
							PROCESS	
							MECHANICAL	
		P–3	ISSUED FOR REVIEW	SL 12/02/10			PIPING	
		P–2	ISSUED FOR REVIEW	SL 11/22/10			CHECK	
FIGURE 6	TYPICAL R.O.W. CONFIGURATION	P–1	ISSUED FOR REVIEW	SL 11/17/10				
DWG. NO.	TITLE	REV.	DESCRIPTION	BY DATE	CHK DATE	APPR DATE		

12" CARBON DIOXIDE PIPELINE CROSSING THE CALIFORNIA AQUEDUCT, KERN RIVER FLOOD CONTROL CHANNEL AND WEST SIDE CANAL

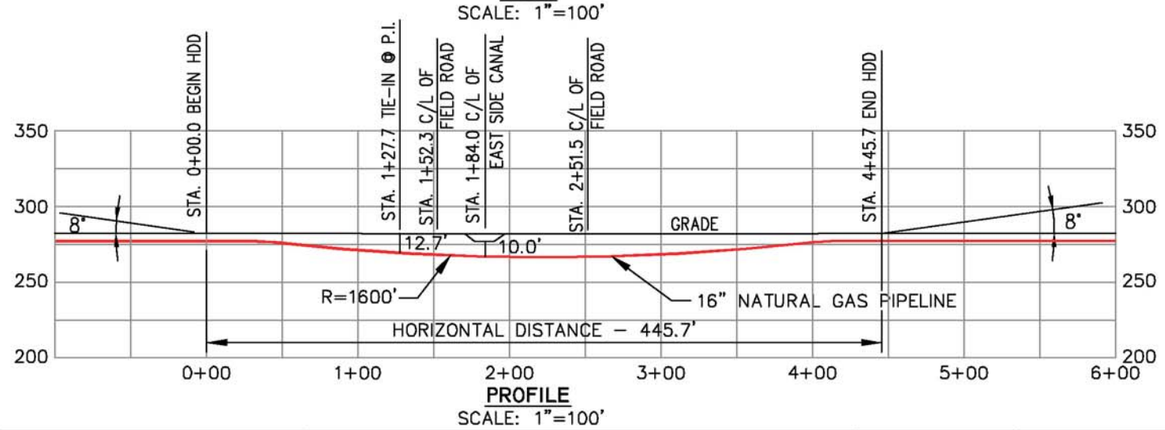
December 2010 Hydrogen Energy California, (HECA)
28067571 Kern County, California

URS

FIGURE 2



PLAN
SCALE: 1"=100'



PROFILE
SCALE: 1"=100'

LEGEND

T.U.A. – TEMPORARY USE AREA (INCLUDES ENTRY/EXIT PITS)
C/L OF WATER BODY
C/L OF ROAD
SECTION LINE
16" NATURAL GAS PIPELINE
PERMANENT R.O.W.
CONSTRUCTION R.O.W.

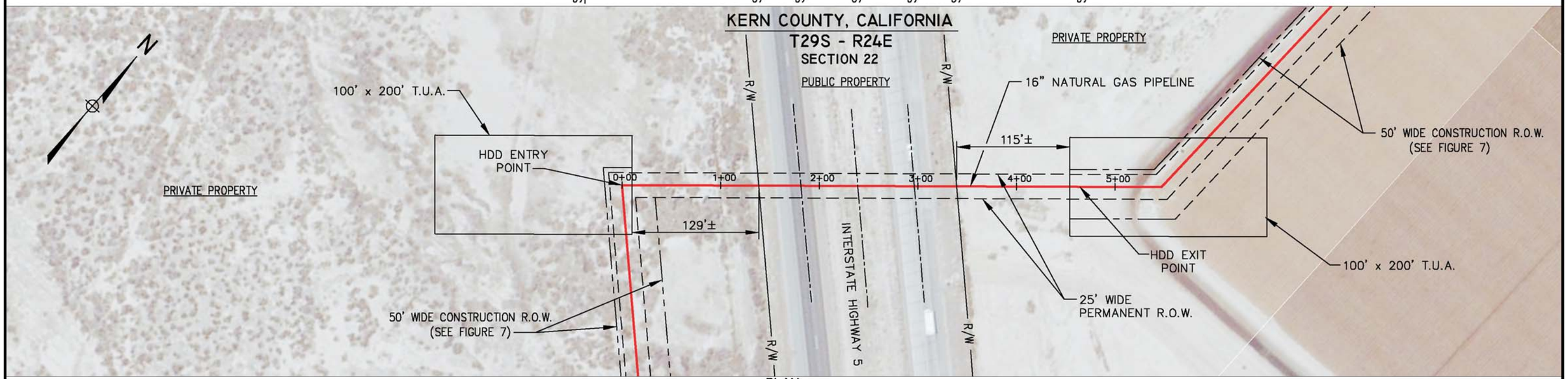
REFERENCE DRAWINGS		REVISIONS					DRAWING APPROVAL	
							DATE	APP'D BY
							CLIENT	
							PROJECT MGMT.	
							PROCESS	
							MECHANICAL	
							PIPING	
		P–2	ISSUED FOR REVIEW	SL 12/02/10			CHECK	
FIGURE 7	TYPICAL R.O.W. CONFIGURATION	P–1	ISSUED FOR REVIEW	CL 10/29/10				
DWG. NO.	TITLE	REV.	DESCRIPTION	BY DATE	CHK DATE	APPR DATE		

16" NATURAL GAS PIPELINE CROSSING THE EAST SIDE CANAL

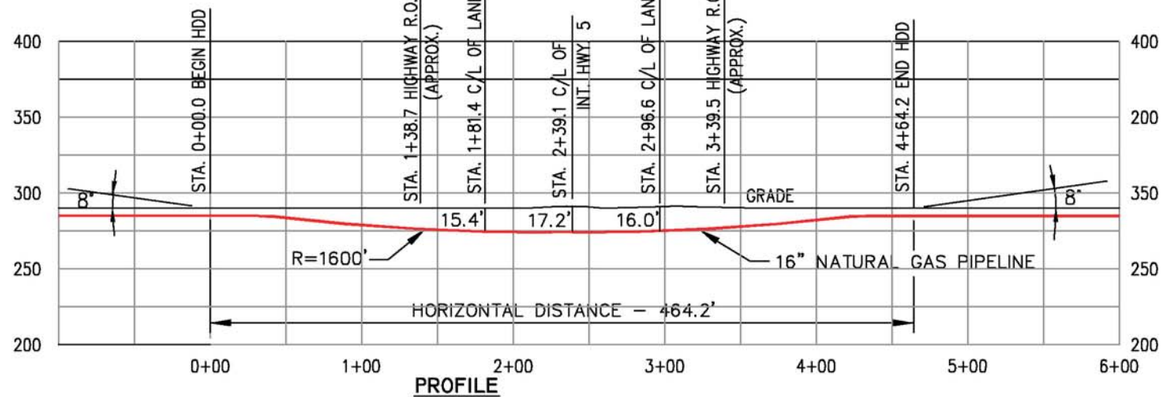
December 2010 Hydrogen Energy California, (HECA)
28067571 Kern County, California

URS

FIGURE 3



PLAN
SCALE: 1"=100'



PROFILE
SCALE: 1"=100'

LEGEND

T.U.A. – TEMPORARY USE AREA (INCLUDES ENTRY/EXIT PITS)
C/L OF ROAD
R/W ROAD R.O.W.
16" NATURAL GAS PIPELINE
PERMANENT R.O.W.
CONSTRUCTION R.O.W.

REFERENCE DRAWINGS		REVISIONS					DRAWING APPROVAL	
							DATE	APP'D BY
							CLIENT	
							PROJECT MGMT.	
							PROCESS	
							MECHANICAL	
		P–3	ISSUED FOR REVIEW	SL 12/02/10			PIPING	
		P–2	ISSUED FOR REVIEW	SL 11/22/10			CHECK	
FIGURE 7	TYPICAL R.O.W. CONFIGURATION	P–1	ISSUED FOR REVIEW	CL 11/16/10				
DWG. NO.	TITLE	REV.	DESCRIPTION	BY DATE	CHK DATE	APPR DATE		

16" NATURAL GAS PIPELINE CROSSING INTERSTATE 5

December 2010 — Hydrogen Energy California, (HECA)
28067571 — Kern County, California

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FIGURE 4

STA. 0+00.0 BEGIN HDD, P.I. 75°49'42" RT.

STA. 0+63.1 R.R. R.O.W. (APPROX.)
STA. 0+75.3 C/L OF DITCH

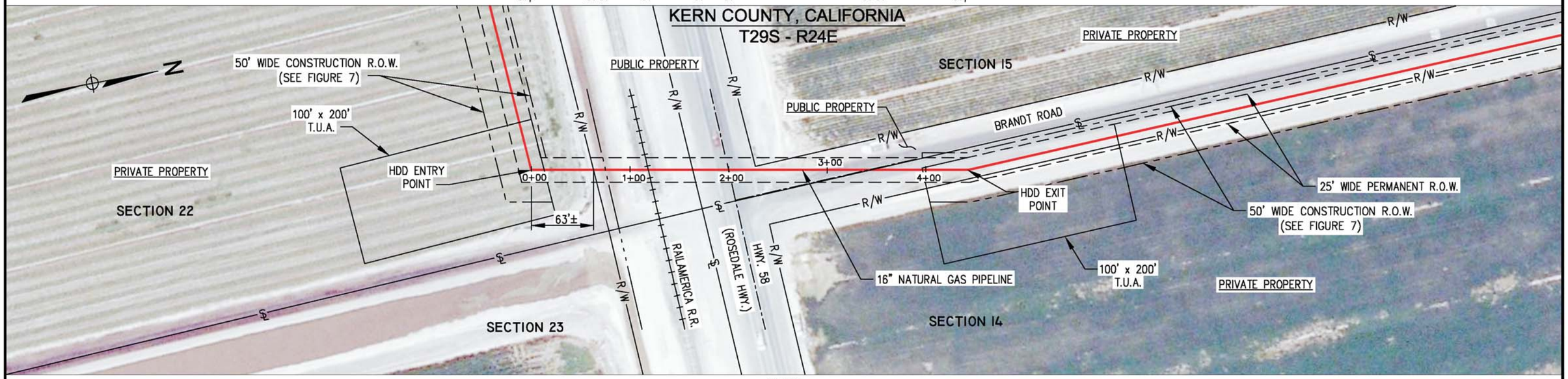
STA. 1+18.6 C/L OF RAILAMERICA RAIROAD

STA. 1+66.3 ROAD/R.R. R.O.W., SECTION LINE (APPROX.)

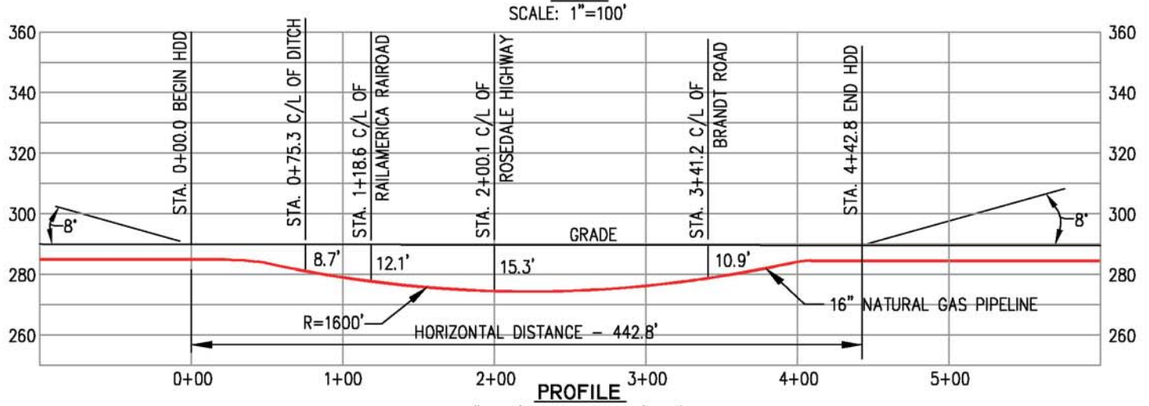
STA. 2+00.1 C/L OF ROSEDALE HWY. (HWY. 58)

STA. 3+41.2 C/L OF BRANDT ROAD
STA. 3+44.1 SECTION LINE

STA. 4+42.8 END HDD, P.I. 12°48'51" LT.



PLAN
SCALE: 1"=100'



PROFILE
SCALE: 1"=100' HORIZONTAL, 1"=50' VERTICAL

LEGEND

T.U.A. – TEMPORARY USE AREA (INCLUDES ENTRY/EXIT PITS)
C/L OF ROAD
R/W ROAD R.O.W.
C/L OF RAILROAD
℄ SECTION LINE
16" NATURAL GAS PIPELINE
PERMANENT R.O.W.
CONSTRUCTION R.O.W.

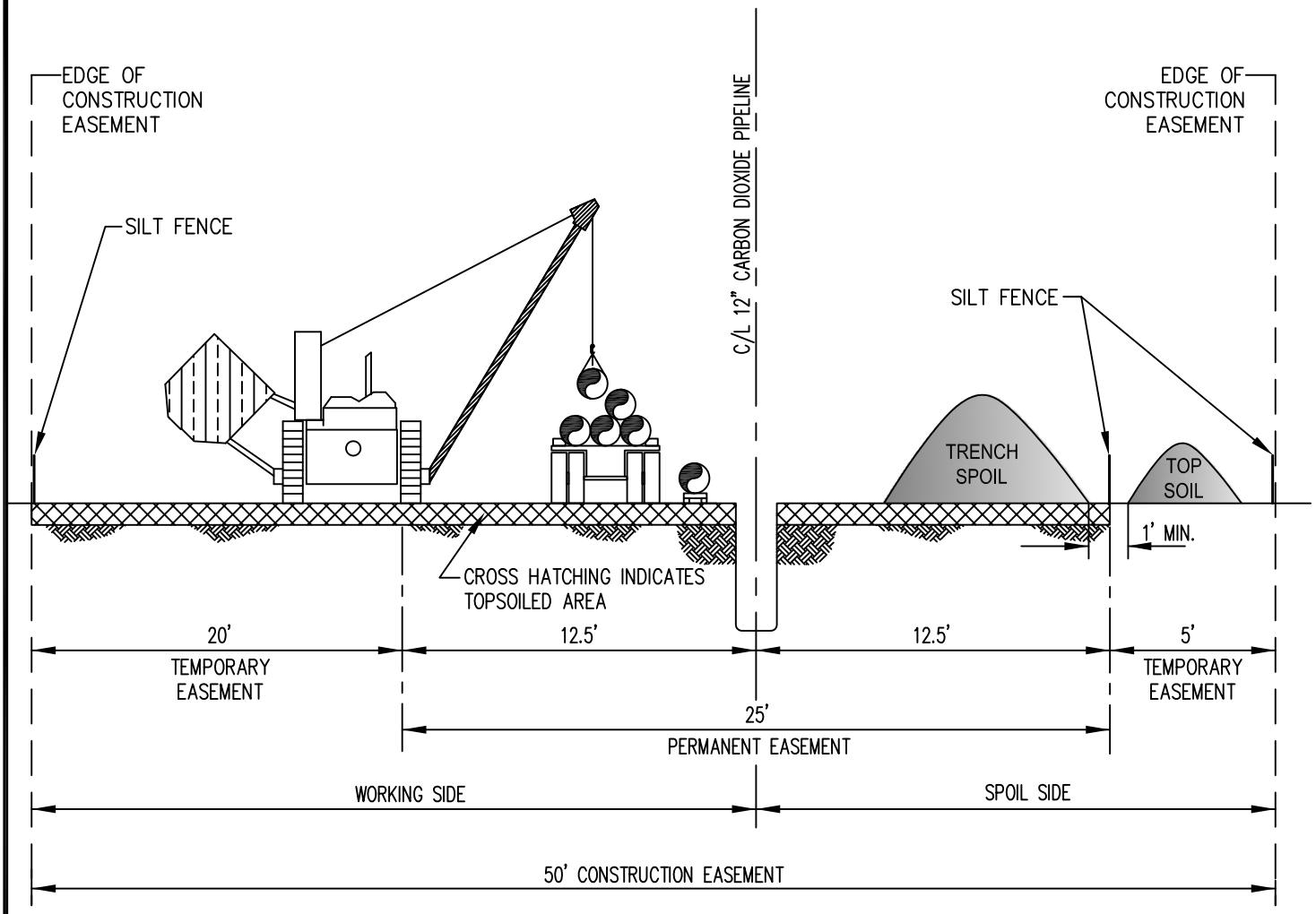
REFERENCE DRAWINGS		REVISIONS					DRAWING APPROVAL	
							DATE	APP'D BY
							CLIENT	
							PROJECT MGMT.	
							PROCESS	
							MECHANICAL	
							PIPING	
		P-2	ISSUED FOR REVIEW	SL 12/02/10			CHECK	
FIGURE 7	TYPICAL R.O.W. CONFIGURATION	P-1	ISSUED FOR REVIEW	SL 11/16/10				
DWG. NO.	TITLE	REV.	DESCRIPTION	BY DATE	CHK DATE	APPR DATE		

16" NATURAL GAS PIPELINE CROSSING HIGHWAY 58 AND RAILAMERICA RAILROAD

December 2010 Hydrogen Energy California, (HECA)
28067571 Kern County, California

URS

FIGURE 5



PROFILE

NOTES:

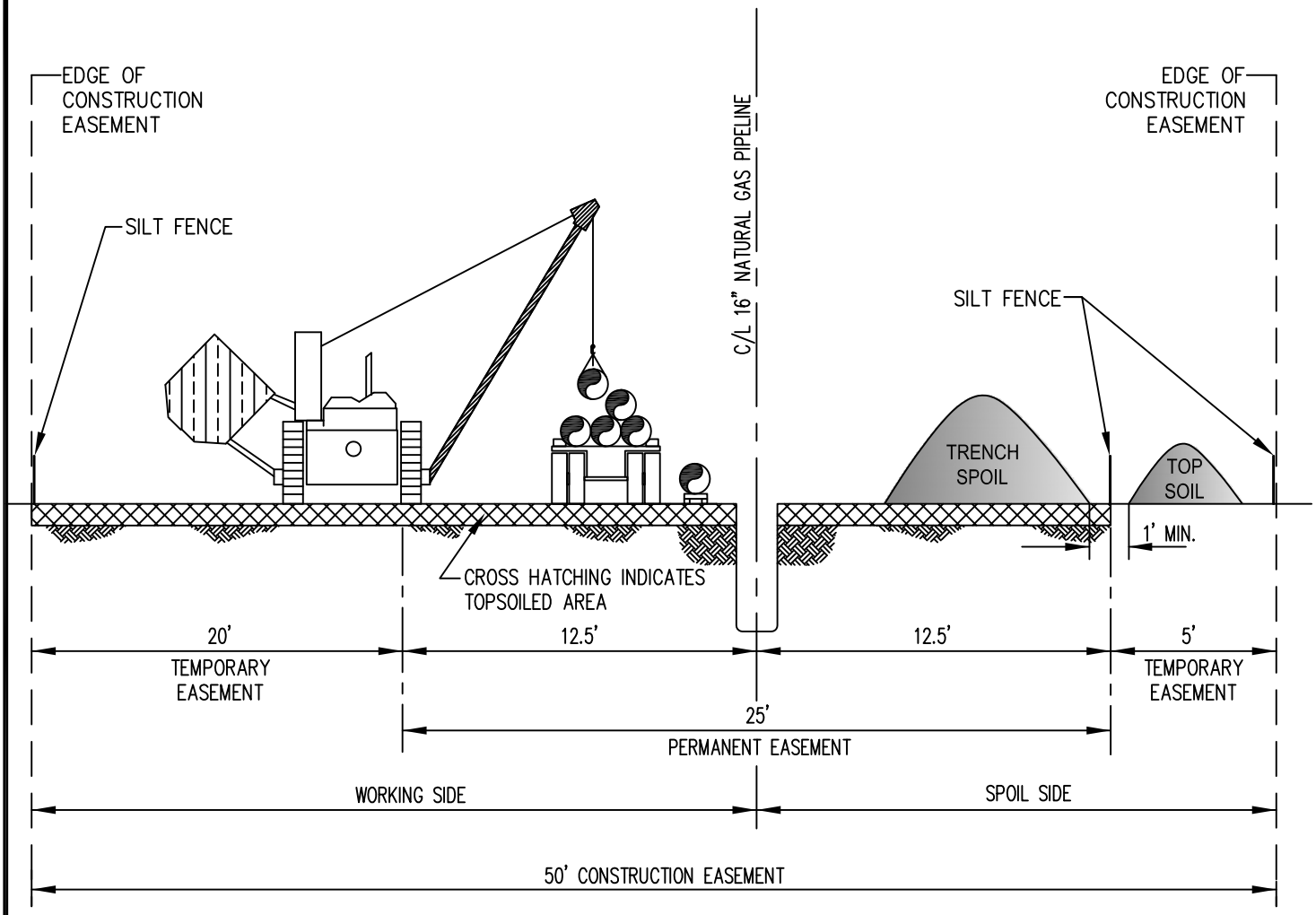
1. 12 inches of top soil will be segregated from the indicated crosshatched area.
2. Topsoil and spoil piles will be kept clean of all construction debris.
3. Gaps in the topsoil and spoil piles will be left at obvious drainages. Scalping vegetated ground surface will be avoided when backfilling spoil and topsoil piles. Upland soils will not be pushed into creeks or wetlands. Topsoil will not be used for padding. Topsoil and trench spoil positions can be adjusted to fit the site as approved by inspector.
4. Top soil will be stored on undisturbed top soil and trench spoil will be stored on sub-soil as indicated.
5. Assume pipeline depth is 5' to top of pipe.

TYPICAL ROW CONFIGURATION
12" CARBON DIOXIDE PIPELINE

December 2010 Hydrogen Energy California, (HECA)
28067571 Kern County, California

URS

FIGURE 6



PROFILE

NOTES:

1. 12 inches of top soil will be segregated from the indicated crosshatched area.
2. Topsoil and spoil piles will be kept clean of all construction debris.
3. Gaps in the topsoil and spoil piles will be left at obvious drainages. Scalping vegetated ground surface will be avoided when backfilling spoil and topsoil piles. Upland soils will not be pushed into creeks or wetlands. Topsoil will not be used for padding. Topsoil and trench spoil positions can be adjusted to fit the site as approved by inspector.
4. Top soil will be stored on undisturbed top soil and trench spoil will be stored on sub-soil as indicated.
5. Assume pipeline depth is 5' to top of pipe.

TYPICAL ROW CONFIGURATION
16" NATURAL GAS PIPELINE

December 2010 — Hydrogen Energy California, (HECA)
28067571 — Kern County, California

URS

FIGURE 7

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION FOR THE *HYDROGEN ENERGY CALIFORNIA PROJECT*

Docket No. 08-AFC-8

PROOF OF SERVICE LIST (Rev. 10/21/10)

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DECLARATION OF SERVICE

I, Dale Shileikis, declare that on December 17 , 2010, I served and filed copies of the attached *Response to CEC Set 3 Data Request No. 209*, dated December , 2010. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: **[www.energy.ca.gov/sitingcases/hydrogen_energy]**.

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

x sent electronically to all email addresses on the Proof of Service list;

____ by personal delivery;

x By delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses **NOT** marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

x sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (***preferred method***);

OR

____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-8
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.